FARMERS DIGEST

JUNE, 1950

Volume 14 — $2.50 a Year
Number 2 — 25¢ a Copy

Nature's Balancing Act ..... *Nation's Business* 1
Band Seeding for Meadow Crops ..... *Ohio Farm & Home Research* 8
No Tassels! ..... *Harvard Alumni Bulletin* 12
Your Best and Cheapest Feed ..... *Farm Journal* 13
Don't Neglect the Growing Birds ..... *Everybodys Poultry Magazine* 18
When Cows Leave Home ..... *Guernsey Breeders' Journal* 21
Fresh Air for Hens ..... *Electricity on the Farm* 26
New Era in Soil Fertility ..... *Missouri Ruralist* 28
Ways to Increase Swine Profits ..... *Hog Breeder* 32
Preservatives for Grass Silage ..... *American Agriculturist* 33
If Calves Could Talk ..... *Ohio Farmer* 35
General Farms Are Obsolete ..... *Successful Farming* 38
721 Pounds Butterfat Per Cow ..... *Maryland Farmer* 44
Corn Drug Relieves Arthritis ..... *Wall Street Journal* 46
Sheep Lead Profit Parade ..... *Cappers Farmer* 48
Save Surface of Soil ..... *Better Fruit* 51
Light Control Breeding ..... *Sheep Breeder* 55
Hunger Signs in Crops ..... *Better Farming Methods* 57
The Business of Cattle Feeding ..... *American Hereford Journal* 60
Three Hogs Went to Market ..... *Marketing Activities* 65
New Northern Sorghum ..... *The Farmer* 72
Nose-Drop Vaccine ..... *Hatchery & Feed* 74
How Much Water Have We? ..... *Christian Science Monitor* 77
Blood Will Tell ..... *Hoard's Dairyman* 82
Gas beyond the City Main ..... *Agricultural Situation* 88
Lebanese Farmers Adopt New Practices ..... *Foreign Agriculture* 90
Highbush Blueberries ..... *Farm Research* 93
Index 95
For the Farmer's Library

The Farmer's Digest

EDITORIAL STAFF:

Editor—L. Bush-Brown Assistant Editor—C. Leavitt Dyer

Business Manager—A. E. Heick

Associate Editors—

John A. Andrew, Jr., James Bush-Brown, Ruth Patrick

ADVISORY EDITORIAL STAFF:

William A. Albrecht
Chairman, Department of Soils
University of Missouri

John D. Beck
Professor of Veterinary Medicine
University of Pennsylvania

Hugh H. Bennett
Chief, U. S. Soil Conservation Service

H. J. Reed
Dean of the School of Agriculture
Director of the Experiment Station and of
Agricultural Extension, Purdue University

W. T. Spanton
Chief, Agricultural Education Service
U. S. Office of Education

M. L. Wilson
Director of Agricultural Extension
United States Department of Agriculture

The Farmer's Digest
Published Monthly except September at Ambler, Pennsylvania
by the Farmer's Digest, Inc.

25¢ a Copy *1 Year $2.50*

2 Years $4.50 *3 Years $6.50*

Canadian and Foreign Subscriptions $3.00 a Year

Entered as second-class matter at the Post Office at Ambler, Pa., July 30, 1948, under act of March 3, 1879. Additional entry at Lancaster, Pa.

The Farmer's Digest

Volume 14 June, 1950 Number 2

Nature's Balancing Act

Condensed from Nation's Business

Harland Manchester

THERE is a fruit farmer named L. J. Farley of Yakima Valley, Washington, who every spring issues 12 gauge shotguns to his hired hands and has them blaze away at the trees in his orchard. They are not shooting pests, they are pollinating the blossoms to insure a good crop of apples. The shells are filled with bulk pollen, which previously has been hand-picked. Farley has found this method a great labor-saver in putting pollen on the opening blossoms where it will do its job.

This is an example of the expedients to which man must resort when he upsets the balance of nature—a trick which he has been performing often in recent years. It is the traditional job of bees and other insects to pollinate flowers, but many farmers have deprived the bees of decent working conditions and they have gone on strike.

First, too intensive cultivation robbed the bees of their natural habitat and drove them back into the wilds; so orchardists had to rent hives of bees in blossom time. Then, modern insecticides have killed many of the rented bees along with the pests they were aimed to control. As a result, professional bee renters will no longer send their hives to orchards where these poisons are used. Because of these factors, many fruit raisers have had to devise ways of doing the work which bees once happily did for nothing.

Nature, if left to herself, has her own intricate methods of perpetuating the many species of animal and vegetable life which populate the globe. In her vast victualing plan, everything from green algae seen in water to the lordly bison and the predaceous tiger is provided for. Everything is destined to eat and be eaten. Of course, we can't leave Nature to

Reprinted by permission from Nation's Business,
Washington, D. C., March 1950

herself because of something called civilization. We can, however, learn that when we interfere with her processes, whether we kill or whether we protect, the matter doesn't stop there. The consequences spread like ripples in a pond, until all living things, including man, are affected to some degree.

There is a fairly new science called ecology which deals with Nature's economic system—what eats what, and what happens when you take some creature's food away or make him move. You'll find ecologists in the Department of Agriculture, in the Fish and Wildlife Service and in many universities. They'll tell you things you never heard of before.

Take this matter of the shortage of bees for pollination. It's not much of a problem in England or France, and many GI's have literally stumbled on the reason. It's those thick hedgerows surrounding the field which provide shelter for birds as well as bees and thus lessen the severity of insect pests and also take care of pollination. These countries are far more densely populated than the United States and farmers are jealous of every square foot of arable land. Fences would save space. But if a stranger so much as sets foot on a Breton farmer's brush-grown earth hedge, the farmer comes running out with a pitchfork.

Now the Soil Conservation Service and wildlife experts are protesting that American "clean farming," with fences that wouldn't shelter a sparrow, helps insect pests to multiply by driving away birds which would be glad to eat them. Field boundary hedges of woody vegetation are advised to reduce the insecticide bill. In some areas, "living fences" of multiflora rosebushes have been planted, which are cheap to install, easy to control, grow so thickly that they bar animals, and provide an inviting habitat for birds and bees.

Farmers are also urged to plant trees and shrubs in eroded gullies and unused corners of their land, thus conserving topsoil as well as sheltering birds. While some birds damage crops, examination of craw contents shows that most of them do more good than harm.

DDT, which has been called the atomic bomb of the insect world, has made a spectacular contribution to man's health and comfort, but when sprayed or dusted in highly concentrated form over a wide area, it may kill as many friends as foes and do damage to all animal life which will take Nature years to repair. Birds, wild and domestic, as well as fish, have died from contact with the compound or from eating insects killed by it. Dosage per acre must be controlled carefully to hit only the selected target. Used in or-

chards, it has sometimes killed the parasites which prey on the wooly aphis and the red spider, causing those pests to multiply profusely.

Bees have been decreasing in Utah at a rate which the state agricultural commission calls a "serious threat to Utah agriculture," because of widespread dusting with insecticides, and because large areas where wild flowers once bloomed have been put to wheat in recent years. As a result, incomplete pollination has injured many orchards, farms and gardens.

Wisely handled, the great insect killer does no harm. One of the smartest jobs anyone has done with DDT is in the Bear Mountain recreational area in New York, a sylvan paradise dotted with lakes and cabins which covers some 45,000 acres and lures campers, fishermen and excursionists at the rate of 3,000,000 a year.

Because screens are no longer needed and all camp and playground sites are free of insects, many visitors believe these conditions exist throughout the entire area. However, DDT residual sprays, applied under the direction of Dr. C. H. Curran, entomologist at the American Museum of Natural History, have been used only in places where people live and congregate. If you wander off into the woods, you're on your own. Any attempt to exterminate insects over a larger region might have set off a chain reaction difficult to control even though Nature always re-establishes her system in time. In fact, she has already developed DDT-resistant flies. Entomologists believe that all insects will learn to live with the stuff eventually—then man will bring out a new killer.

And meanwhile the U. S. Public Health Service predicts that malaria can be wiped out as a major health problem in this country by the middle of 1952 by the use of DDT sprays plus improved diagnosis and treatment. More than 5,000,000 DDT spray jobs have been done in southern houses in the past five years.

Kindness to animals is a commendable trait, but sentimentalism has done a great deal of damage, both to wildlife and man's livelihood. Uncontrolled "bambiism" has ruined millions of dollars' worth of crops and forest without doing the deer any good.

About 30 years ago, according to legend, some fisherman from Nantucket Island sighted a creature with antlers and dragged aboard an exhausted buck which they decided had swum over from Martha's Vineyard or the Massachusetts mainland. He became the first deer on the island. People made much of him, and a wealthy summer citizen imported a doe.

In a few years there were more deer than there was forage to feed them, and no one's garden was safe.

An open season was declared, and since the island has little cover, the slaughter was terrific, bringing protests from sportsmen all over the state. Now things are under better control, but Nantucket is still no place for deer.

There was the case of the 1,000,000 acre Kaibab Forest in northern Arizona, where mule deer were getting along all right until, early in the century, hundreds of mountain lions, coyotes and timber wolves were killed off because they preyed on the deer. As a result, the deer increased by about 500 per cent and ate themselves out of house and home. Saplings were gnawed to the roots and large forest areas were devastated for years, paving the way for land erosion. It took a great deal of time and trouble to undo the damages.

If you deprive any species of its natural predators, unfortunate results are almost inevitable. All life can be envisioned as a great pyramid. At the base is grass and the tiny water organisms called plankton, which support the fish. Rodents and the larger herbivorous animals, smaller in number than the plants they eat, make up the next layer. Then come the flesh-eating animals, fewer in number than the vegetarians.

Like most attempts to explain life by a diagram, this one is ragged and incomplete, but man, in his arrogance, may place himself at the top if he wishes, since animals are not organized. Knock out a brick anywhere in the great natural structure and a kind of biological earthquake takes place, often to man's great distress, until time brings about a readjustment.

Probably the world's chief exhibit of disastrous interference with Nature's balance is New Zealand. In its natural state, the country had no land mammals except bats. In 1864, homesick English settlers imported two does and a buck from the deer herd in the Royal Park at Windsor Castle, England. With lush grazing and no predators, the deer multiplied until they became a national menace. Whole forests were destroyed and serious erosion set to work in some of the mountain districts. As forage became scarcer, the deer became thinner and smaller until good specimens were hard to find.

One logical solution would have been the introduction of wolves and cougars, but sheep raising is a big New Zealand industry, and ranchers would not permit this. The commercial sale of venison might also have helped out, but there was the matter of competition with mutton in the market. So taxpayers shouldered the burden of supporting professional

hunting parties, paying a bounty on all tails.

New Zealanders also brought in the English rabbit which burrows. He has proliferated hugely, inducing forage shortage and soil erosion. And nostalgic bird lovers imported from England the blackbird, sparrow, starling, finch, and linnet, and from India the myna. As a result, fruit, which ought to be cheap and plentiful, is costly. Ira N. Gabrielson, head of the Wildlife Management Institute in Washington, tells of small New Zealand orchards which are enclosed completely by wire at great expense to keep out birds and rabbits.

And that is not all. American blackberries were brought in. The birds ate the berries and spread the seeds far and wide. Now there are great areas of impenetrable blackberry thickets where sheep once grazed.

Another infamous importation is that of the rabbit to Australia. The first to enter the country were placed near Sydney and Melbourne where they were surrounded by forests and predators, so no harm was done. But when Thomas Austin of Barwon Park near Geelong, southwest of Melbourne, brought in 24 wild rabbits for his game preserve in 1859, he unleashed a costly plague from which his country may not recover for centuries. Within six years, Austin, apparently aware of his error, had killed 20,000 rabbits, but estimated that there were 10,000 left. They spread rapidly throughout southern Australia, depleting pasture land, ringing small trees and paving the way for wind erosion. Not only are large sums being spent on fences and poisons, but it is said that five rabbits take the feed of one sheep. The ranges of New South Wales, it is estimated, would carry 12,000,000 more sheep if only that ship bearing Austin's rabbits had never sailed.

Many animals which win praise at home become victims of critical newspaper editorials when they emigrate. The brown Norway rat is given important credit by Charles S. Elton, the British ecologist, for aid in stamping out bubonic plague in England. Living mainly in sewers, the Norway rat drove out the black rat which lived in houses where his fleas spread the disease to man. But when the Norway rat went to Cuba on ships, he multiplied rapidly and became a great pest. To curb him, the Cubans introduced the mongoose, immortalized by Kipling as a foe of the cobra. The mongoise did his job thoroughly and then went on to raise havoc with ground-nesting birds, which were not mentioned in the contract.

Brought also to Jamaica to kill rats, the mongoose cleaned them up and went on to devour young

pigs, kids, lambs, kittens, puppies, bananas, corn, birds of many kinds and harmless lizards and snakes. So a campaign got under way against the mongoose.

Man also interferes with the natural balance by destroying valuable animals because of prejudice or misinformation. For some reason, boys with their .22's and their fathers with their shotguns always are blazing away at flesh-eating animals with the mistaken notion that they are public enemies. Skunks, hawks and snakes are favorite victims, the first two because they sometimes get away with a few chickens, and the snake because of the highly publicized homicides of a few bad actors.

The skunk devours large quantities of grasshoppers, cutworms, weevils, white grubs and mice, thus preserving vegetation. He also supplements his diet with fledgling birds, but there's no use getting excited about that, because most birds are taken by other predators, or die from heat, storms, cold or food shortage. Nature produces far more of everything than she needs, and apparently is interested only in the preservation of the species, depending upon predators and other limiting factors to keep any species from getting out of hand.

In at least one case the wholesale slaughter of skunks brought about the virtual extermination of wild ducks. A big marshy area in northern New York was a duck-shooter's paradise until skunk fur became fashionable and trappers moved in. Skunks had been eating the eggs of snapping turtles. This check removed, the turtles hatched in such great numbers that they ran short of food and ate up the young ducklings. After a time, the price of pelts went down, skunks increased, skunks ate turtle eggs, turtles stopped eating ducklings, and once more the swamp was alive with ducks.

The appearance of a hawk—any kind—near a farm which has chickens is usually enough to bring the shotgun down off the antlers. He is usually no cause for alarm, states Richard Pough of the American Museum of Natural History. In any given region of the United States there may be from 15 to 24 species of hawks, while only three species—the goshawk, the Cooper's hawk and the sharp-shinned hawk—live largely on birds. After a study, Pennsylvania passed a law protecting all but these three types. The bird eaters have long tails and short, blunt wings. They seldom sail or soar, but perch under cover and pounce on their prey. Hawks which habitually soar in graceful circles live largely on rodents, and are an economic asset.

The snake, which arouses in many people a savage desire to kill, plays an important part in

Nature's design for keeping rodents from overrunning the earth. Clifford H. Pope, noted herpetologist, tells farmers that killing bull snakes, the foe of the pocket gopher, is like tearing up $5 bills. Out of some 150 types of snakes in the United States, only four are poisonous: the rattler, the copperhead, the water moccasin and the coral snake, and even they destroy great numbers of rodents. Even in India, where there are many deaths from cobra bites, the destruction of all cobras might easily cause many more deaths by permitting an increase of disease-spreading rats.

As a general rule, no small carnivorous animal should be killed unless he directly menaces man or his livestock, for he plays an important role in the complicated economy by which man lives. Man exists on the surplus vegetation which remains after storm, drought, disease, insects and the small herbivora have taken their toll, and without flesh eaters to curb the plant eaters, they would multiply to the point where human existence would be jeopardized.

As for haphazard introduction of animals, birds or plants into countries where they may not fit, the world should have learned its lesson. Clarence Cottam, assistant director of the Fish and Wildlife Service, proposes that each nation establish a board of competent biologists to rule on all importations or exportations of plant and animal life.

Only by studying Nature's highly involved economic system and trying to follow the rules can man stave off far-reaching biological disaster.

2,4-D Geese

Strawberry growers have made a big discovery about geese—they'll do a better (and cheaper) job of weeding strawberries than anything else.

Last year Theodore Berry, Washington farmer, put 16 geese on his weediest three acres of strawberries. The geese cleaned those acres of all kinds of weeds—even quack grass. They never touched a strawberry leaf.

Those three acres made a good profit for Berry. The year before he had spent $500 hand-weeding them, and still the yield was so low that he lost money.

W. J. GRANBERG
—Farm Journal

Band Seeding for Meadow Crops

Condensed from Ohio Farm and Home Research

J. L. Haynes and L. E. Thatcher
Ohio Agricultural Experiment Station

An improved method for obtaining meadow seedings is being developed at the Ohio Station this year. The method looks promising for use where good catches of legumes are difficult to obtain. Early field tests have given legume stands which are much superior to those sown by the usual seeding methods.

The most important feature of this method is the use of a starter fertilizer with the meadow seeding. The fertilizer is placed so that it is reached by the seedlings immediately after germination. This is done by banding both the seed and the fertilizer. We call this the "band seeding" method to distinguish it from other methods for seeding meadow crops.

While in the seedling stage, legumes are normally poor rustlers for nutrients from the soil minerals. Even when grown without small grain and on fertile soil, alfalfa is 4 to 5 weeks old before it is able to get enough minerals from the soil to make maximum growth rates. Legumes in the seedling stage seem to have particular difficulty in obtaining adequate phosphorus from the soil.

Seedling alfalfa shows remarkably fast growth when the seedlings are given supplementary phosphate. Such plants reach the stage where they are able to obtain their mineral needs from the soil at a much earlier stage in growth than is the case with unfertilized plants. Red clover, birdsfoot trefoil, and timothy also show vigorous growth response to supplementary phosphate in the seedling stage, but their response is less spectacular than that of alfalfa. On the low potassium soils, mixed fertilizer, placed near the legume seeds, helps to sustain the seedling growth. The effect of the potash on seedling growth usually does not become apparent until about a month after germination.

In developing the band seeding method, different combinations of seed and fertilizer placement were tried to find a practical way to take advantage of the stimulation of legume seedlings by phosphate. For spring seedings in winter wheat, we found that drilling the meadow crop seed and superphosphate together was superior to

Reprinted by permission from Ohio Farm and Home Research,
Wooster, Ohio, January-February 1950

broadcast seedings. However, when mixed grades of fertilizer were drilled in contact with the legume seed, the stand was rather poor due to germination injury. The injury was especially serious when large amounts of mixed grades of fertilizer were used in contact with the legume seed.

The legume seedlings in spring sown grain, made excellent growth when the seed was drilled in rows directly over fertilizer bands placed at a depth of about 1½ inches below the seed rows. The effect of the starter fertilizer on seedling growth persisted longer when a mixed grade containing both phosphate and potash was used rather than straight superphosphate in seedings made over, but not in contact with the fertilizer bands.

The placement of fertilizer in bands directly beneath the legume seed rows gave seedling performance superior to any combination of broadcasting seed or fertilizer in summer meadow seeding tests. Preliminary tests indicate that seeding rates needed with the band method may be only 3/4 to 2/3 of those needed for good stands by broadcast seeding methods. Accurate placement of legume seed over the fertilizer bands is important to success of the band method —alfalfa seedlings as much as 1/2 inch to one side of the fertilizer bands perform as unfertilized plants.

Ordinary grain drills were used to obtain desired placement of meadow seed and fertilizer in the Station tests. Accessories used have been either standard equipment or simply-constructed modifications. Although we have worked out the more obvious 'bugs' in the method, it is still being improved. Pending further refinements of the method, the cautions listed in the following paragraphs should be observed in making band seedings of meadow crops.

Seedings in Spring Small Grain. For seedings in oats, the small grain and fertilizer are drilled together in the usual manner. However, the tubes from the grass box of the grain drill are extended to drop the meadow crop seed in the furrow behind the disks. This leaves the seed uncovered in rows directly over the fertilizer band and small grain. In our case, the seed box tube extensions were made from pieces of garden hose. The lower ends of the hose were fastened to the loops which are ordinarily used for attaching the drag chains to the drill. An angle cut on the lower end of the grass tube extensions is an aid to inspection for detecting stoppage while seeding.

The open end of the seed tube is best set only an inch or two above the soil as the drill is operating. This is to insure that all the seed falls over, and not to one side of

the fertilizer band. Accuracy of placing the seed over the fertilizer is important to the success of the band seeding method. If the meadow seed falls between the fertilizer bands, the seedling advantage is given entirely to the grain crop and annual weeds rather than to the meadow crop. In our tests with seeding in oats, excellent results were obtained when no attempt was made to cover the banded meadow seed after it dropped in the furrows behind the disks.

Commonly recommended grades and rates of fertilizer for oats may be used with the band seeding method, however, where annual weeds are likely to be a problem, fertilizers for band seedings should contain no nitrogen. For best results with the meadow crop, the drill should be set so that the band of fertilizer with oats is about 1 1/2 inches below the surface-band of meadow crop seed. No damage to legume seedlings due to the use of mixed grades of fertilizer occurred with this method.

Seedings in Winter Grain. Maintenance fertilizer for the following meadow crop is properly included in the fertilizer application drilled with winter wheat in the fall; however, the fertilizer drilled with the winter grain is of little benefit to the spring seeded legumes until after grain harvest. This means that if seeding establishment of the legumes is to be aided by fertilization, the fertilizer must be applied directly to the legume seedlings.

For direct fertilization of spring seeded legumes in winter wheat, the standard tubes from the grass box are inserted in the fertilizer tubes to drill the seed and fertilizer together. Straight superphosphate, rather than mixed grades, should be used to avoid germination injury. Since this is strictly a starter fertilizer application, rates need not be heavy—200 pounds per acre were used in the Station tests.

By the time wheat land is dry enough in the spring to carry a drill, most soils are usually compacted so that the disks cut narrow grooves, rather than making a loose furrow in the soil. On sloping land, the band seeding should be made with the drill running across the slope in order to reduce the tendency for seed and fertilizer to be washed from the grooves made by the disks. The drill should run 1/2 to 3/4 inches deep. The wheat recovers from the ragged appearance caused by the drill within a week or two. The drill operation seems to have no effect on final grain yield. Although band seedings in wheat have been superior to broadcast seeding, the method has not given results which were as spectacular as those obtained with the band method in summer seeding and with seedings in oats.

The band seeding method can

not be used during seasons when wheat fields stay too wet to enter with a drill until after the grain starts to shoot head. We do not have enough experience with the method to know how often this will happen, but it is a risk which should be considered in selecting the method for seeding legumes in wheat.

Summer Seeding Without Companion Crop. The most important single feature of a successful seedbed for summer seedings is firmness of the soil beneath the seed. This principle applies equally to band and broadcast seedings. Summer fallowing, starting immediately after grain harvest, is decidedly advantageous in obtaining successful summer seedings made in early August.

With seedbeds which were firm beneath, prepared by summer fallowing, best results in our tests were obtained by using the type of band seeding described in a preceding paragraph for spring small grains. Mixed grades of fertilizer, in any quantity desired for maintenance of stand, may be drilled 1 1/2 inches to 2 inches deep with the meadow seed dropping in the furrows behind the disks. Up to 500 pounds per acre of 0-20-10 were used with good results. With a seedbed which is firm below, cultipacking is not required following this way of band seeding. In our tests, heavy rains soon after germination did not seriously damage summer seedings made by this method. Although this method gave very good seedling performance on stubble land prepared by disking, the usual nuisance of volunteer grain was present where the stubble was disked instead of being plowed and summer fallowed.

The band seeding method is not to be considered a 'cure-all' which dispenses with the necessity for all other precautions which have hitherto been necessary in successful culture of meadow crops. The method is merely another aid in obtaining meadow stands which may be added to the proven practices of meadow crop culture already in use.

Those who are dissatisfied with meadow stands obtained by ordinary methods may wish to use the method in its present stage of development. Although results with band seeding methods have given very good results in our tests, keep in mind the fact that it is a new method—almost as new to us as it is to you. Like all new practices, unexpected 'bugs' in the method are likely to appear under conditions which we do not anticipate. For this year, we suggest that the band seeding method be used on a trial scale—small enough so that its success or failure won't "make or break" the crop sequence. Your County Agricultural Agent will be interested in your experience with the method.

No Tassels!

Condensed from Harvard Alumni Bulletin

A NEW METHOD of producing hybrid corn seed which does away with the highly expensive and wasteful process of "detasseling" was reported recently by Paul C. Mangelsdorf, Professor of Botany, and Donald F. Jones, S.D., Harvard-trained geneticist and now head of the genetics department of the Connecticut Agricultural Station in New Haven. On the basis of tests which they have carried on jointly over the past several years, they have now perfected what they believe is a method promising to "revolutionize the hybrid seed corn industry."

Being a part of a revolution in corn-growing comes as no new experience to either man. Trained by the late Professor Edward Murray East, who established the theoretical basis of hybrid vigor in 1909, both have seen their names become permanently linked with new ideas in corn production. Jones was responsible for introducing the famed "double cross" which made the new hybrid corn practical; while Mangelsdorf, primarily interested in the practical applications, spread the news and method southward into Texas and thereby extended the corn belt 1,000 miles farther south.

Hybrid corn seed is produced by an elaborate process of growing alternately tasseled and untassled rows of corn plants. Pollen-bearing tassels on the alternating plots of corn must be completely removed by hand before any pollen is shed so that the resulting seed is fathered only by the pollen parent. Thus, a uniform type of controlled parentage is insured.

The standard method often results in decreased yields, either because of injuries to the plants or because of greater exposure of the plants to disease. Professor Mangelsdorf describes it as "the peskiest and most expensive part of the business of raising seed corn." The latest Jones-Mangelsdorf method, which has been thoroughly field-tested, removes the necessity for "detasseling" by introducing a plant which provides no pollen in its tassel.

What produces this pollen-less plant is a characteristic called "pollen sterile." First discovered by Mangelsdorf in a variety of Texas corn, this feature was found to occur naturally, but was of no use until scientifically crossed and back-crossed for several generations, making it possible to reproduce the sterile characteristic in

Reprinted by permission from Harvard Alumni Bulletin,
Cambridge, Massachusetts, January 28, 1950

any inbred strain of corn. Using this procedure the new hybrid process can be used in the production of any hybrid, using a sterile "inbred" as one of the two seed-parent "inbreds."

Your Best and Cheapest Feed

Condensed from Farm Journal

Ralph D. Wennblom

IT costs you four times as much to feed a cow at the manger as it does on pasture.

Feed, whether you grow it yourself or buy it, is always your biggest single expense in raising livestock. So if we're going to keep on making money on meat, milk, wool, eggs, we've got to cut those costs.

Pasture is the best way to do it. You can make a thousand pounds of pork with 15 to 18 *fewer* bushels of corn, and 500 pounds *less* protein supplement, if you have an acre of good legume pasture. If you're fattening steers, an acre of pasture can save 20 bushels of corn, and cut your protein needs in half.

Consider a few figures from the USDA's Experiment Station at Huntley, Montana. The Montana folks grew several different kinds of crops, and irrigated them so that each would have an even chance.

An acre of pasture furnished 250 days of grazing, and produced 100 pounds of *actual* feed (what the scientists call "total digestible nutrients") for only 29 cents. *Alfalfa hay* (it made 4.7 tons per acre) produced 100 pounds of actual feed for 49 cents. *Corn silage* (13.7 tons per acre) cost 91 cents per 100 pounds of feed. *Grass silage,* $1.17.

But with *corn* (63 bushels per acre), that 100 pounds of feed cost $1.29—exactly a dollar more than it cost to get the same amount of feed from pasture. With 66-bushel *oats,* the cost was $1.19; with 40-bushel *barley,* it jumped to $1.40.

Now, if you're getting yields like these, and feeding the grains to your livestock when they could be on pasture, you're passing up the best way you've got to get those feed costs down.

To get them down, we've got to do something about it. Most of us just let our pastures take care of themselves. We treat them like a runty pig or a three-teated cow— put them on land too poor to grow good crops. We call them "pastures," but they're really nothing more than gymnasiums during most of the summer. What

Reprinted by permission from Farm Journal,
Philadelphia, Pa., April 1950

little feed we do get is bound to be expensive. But that's our fault.

You've got to fertilize. *Each ton of commercial fertilizer that you put on pasture will make an extra thousand pounds of beef, or 8000 pounds more milk.*

Most pastures are starving for more food. What to apply? Your safest bet is to test the soil. Find out how much lime, and what kinds and amounts of fertilizer it needs.

Plant the grasses and legumes that will make the most feed on *your farm.* Use certified seed if you can. At least know where it was grown. Not even an expert can tell by *looking* at a seed what kind of pasture it will make.

Grow these two together. Legumes and grasses improve each other. A mixture will usually produce a fourth to a half more feed than either growing alone. You'll also have fewer bare spots in your pasture. Where the legumes don't come up, or die out, the grasses will usually take over.

Besides, a good crop of legumes will grab up to 200 pounds of the 32,000 tons of nitrogen floating over every acre of your farm, and put it into the soil for the grass and following crops to use.

In Massachusetts, County Agent Paul Brown checked 20 dairy herd records in November. Cows were averaging $9 profit after feed. When he checked the same farms in May, they were making $42 profit per cow. Good pasture made the difference.

How Much Pasture Do You Need? Enough so your livestock won't ever go hungry—even in a dry year; enough so that you will have good, lush grazing from early spring until late fall and during the winter, too, if you live in the South or on the West Coast.

That may mean a few acres more than you'll need in an average year. But it won't go to waste. You can make it into grass silage —the next best thing to pasture itself—or hay.

Don't let the number of acres you've got fool you. You can't count on much pasture from land in trees. In Minnesota, wooded pastures made only a fourth as much feed as open pastures. And in Wisconsin, only one-eleventh as much!

A better idea is to clear and improve land that's suited to pasture (leave a few trees for shade), and fence off the rest for timber.

Naturally, your permanent pasture belongs on land too steep, too wet, or otherwise not suited to the plow. But using the same permanent pasture year after year for hogs, or as a feed yard for other animals, is poor business. Your *crop land* needs to grow legumes and grasses every few years, too.

Livestock are the handiest manure spreaders you've got—keep them moving from field to field.

If you can get along without permanent pasture, so much the better.

High ground that dries up quickly is the best spot for your early spring pasture. Grazing wet ground can be mighty hard on a stand. That's why it's a good idea to separate high ground from low ground with cross fences.

Be careful where you put those fences. Cattle like to follow them, and cowpaths grow into gullies when the fences run up and down the hills. Use electric fence for rotational grazing. Set the posts at an angle so you can mow under the wire. Otherwise tall plants may short the current.

You don't always have to reseed. If you have at least half a stand of the plants you want, you can feed them and get fairly good results.

But it's always quicker (and usually pays better) to start from scratch. There are several ways to go about it, but most of them boil down to this:

Clear and level rough, brushy, stumpy, or stony cut-over areas. Brush steals plant food and moisture, and level land is easier to work and *mow*.

Put on lime if the soil needs it. Then tear up the old sod as though you were going to plant a crop. You can use a disk, field cultivator, or spring-tooth harrow. Very shallow plowing also works, but if you can work it up without plowing, so much the better.

The idea is to kill out the old grasses and weeds so that they won't smother your new seeding. Be sure to leave a trash mulch on top; keeps the ground from washing, and gets seeds off to a better start.

When seedings fail it is mostly because of a poor seed bed. Prepare a smooth, firm one. Then seed your mixture—¼-inch is deep enough—and, at the same time, apply the fertilizer. Follow with a roller or cultipacker.

If fall seeding works best in your part of the country, start rebuilding your pasture as soon as your livestock finish grazing off the spring growth. Where spring seedings work best, you can work up the sod in the fall and leave it over the winter—provided soil blowing isn't a problem. In some areas, particularly the Northeast, you'll need to start disking in August in order to kill the old bluegrass.

You start new pastures about the same way. After row crops, you can usually work up a seed bed without plowing.

In 1948, William Knoblock, Stark County, Illinois, had trouble feeding 11 cows on 15 acres. He ripped it up—seeded a ladino-alfalfa-brome mixture. Last summer, the same ground fed 20 cows, and made 28 tons of hay to boot. (He divided the field into three 5-acre fields, grazed each separately.

Too much grazing ruins more pastures than the weather ever will. Here's a rule-of-thumb some farmers use to see if they're over- or under-grazing their early summer pasture. If more than a fourth of the pasture is still un-grazed by June, it's under-grazed. If less than 10% is un-grazed, the cattle will probably run out of feed before other pasture is ready in July.

Take your cue from the legumes in your mixture—they're the hardest to keep. When the grass gets too tall, you lose the legumes.

Give pastures a chance to make fairly good growth in the spring before you start using them. Let ladino-grass mixtures get at least 8 inches tall, and never graze them any closer than 2 or 3 inches.

Hay-type grasses and legumes can't be grazed that close. Alfalfa and brome, for example, shouldn't be grazed any closer than 8 inches in May and June, and not closer than 4 inches during the rest of the summer.

Some farmers divide a pasture into smaller fields and graze each field separately, to get more even grazing. You usually get more feed, too, but not always enough to make up for the fencing and trouble. Most farmers figure that it's the easiest way to keep the legumes from going out of the mixture.

How much extra feed can you get? Well, in 6-year tests at Beltsville, permanent pasture grazed in rotation made about 12% more feed than pastures grazed continuously.

Many dairymen rotate in order to give their milking cows first crack at the lush growth. They turn in heifers and dry cows for the clean-up. Pastures grazed in rotation are usually ready after a 3- to 5-week rest.

Keep the mower handy. Mowing pays good wages—usually makes a pasture produce about a third more feed. For one thing, small young legumes and grasses taste better, and are considerably richer. Besides, mowing keeps down weeds, bushes, and briars.

When to mow? New Jersey says 3 or 4 times a season, immediately after a field has been grazed. In Tennessee, bluegrass mowed twice produced $16 more milk per acre than un-mowed. Early summer mowings pay best. And don't mow (or graze) too late in the fall. Plants need about a month's growth (at least 4 inches) to take with them into the winter.

Break up and spread cow "chips" with a harrow. But don't expect them to supply all the plant food your pasture needs. Put on phosphate and potash when soil tests say you need it. In many parts of the country, soils need boron to grow legumes, especially alfalfa.

How can we clip the corners off winter? Top-dress with nitrogen in the fall or very early in the spring

to get plants off to a quicker start. Last spring, 54 southeastern Ohio farmers top-dressed their pastures with 60 pounds of nitrogen per acre before April 1. These pastures were ready for grazing two weeks sooner than those given no nitrogen, and made 70% more feed during the season. The nitrogen cost $9 per acre, but it made at least $30 worth of extra milk.

In the South and on the West Coast, farmers keep grasses, clovers, and the winter small grains growing the year around with nitrogen.

At Experiment, Georgia, a fertilized mixture of winter oats, ryegrass, and crimson clover made $192 worth of milk per acre between November and May. Of this, $110 was net profit.

Spring and fall grains can add a month to each end of your grazing season. Rye is one of the best; oats and wheat aren't far behind.

In the northern and central prairie states, crested wheatgrass pastures start growing 2 or 3 weeks sooner than grama and some other native grasses. Ranchers fence in their crested wheatgrass and use it for feed during lambing and calving time.

In the Southwest, range reseeded with native grasses makes three to four times as much meat as native range.

Have "hot weather" pastures ready for your live stock. Sweet sudan is one of the best; the lespedezas and kudzu are also good. Let sudan get at least 18 inches tall before you graze.

You can use the same pasture for more than one kind of livestock. Milk cows and sheep get along fairly well. Sheep will eat plants and weeds (dock, for example) that cows won't (and probably shouldn't) touch. Hogs and beef cattle mix all right, too.

Be careful not to over-stock. A combination of livestock can graze out a pasture in a hurry.

Bloat is a problem on straight legumes. The danger isn't so great if your pasture is about half legumes and half grasses. Mowing a few strips across your pasture is an easy way to supply cattle with dry feed, which always lessens the danger of bloat.

Check to see if you can grow ladino. It's the most talked-about legume at the moment, but it won't take as much cold and dry weather as alfalfa.

In New England last year, 2,700 farmers entered the annual Green Pastures Contest. *All 18 winners grew ladino as their main pasture crop.*

Some of the Nation's highest producing dairy herds are on irrigated ladino-alta fescue pastures in Oregon. Ladino is tops for poultry, and makes even better hog pasture than alfalfa.

When it comes to exactly what mixtures you should use, your own State College is your best bet.

They have a pretty good idea of what plants will make the best feed on *your farm.*

Generally speaking, the trend is toward simpler mixtures—one or two legumes and one or two grasses. Usually, one of each takes over within a fairly short time anyway.

Pastures are double-barreled cost cutters. They're feeding your stock, and at the same time building up your soil.

For example, Iowa land in corn for 17 years straight made 21 bushels per acre in 1948. (A good corn year, too.) Across the fence, corn rotated with oats and meadow made 85 bushels per acre.

At Temple, Texas, the tenth crop of continuous cotton yielded 423 pounds of seed cotton per acre. Cotton grown in rotation with a legume pasture made 1,110 pounds.

Can you blame people for getting excited about their good pastures?

Don't Neglect the Growing Birds

Condensed from Everybodys Poultry Magazine

Paul F. Worcester

Good pullets, unlike the storybook Topsy, won't just grow. Yet every year we see chicks which have been carefully started in the brooder house turned out on range or put in rearing shelters and left to virtually shift for themselves. The growing period has been termed the most important yet most frequently neglected time in a bird's life by many poultrymen. And rightly so, for "out of sight, out of mind" seems to apply all too well in pullet rearing.

"We don't want to baby our birds," some poultrymen say. That is quite true, but there is a big difference between rearing rugged birds and just turning them loose to grow. Pullets don't need a lot of special care during the growing period, but they do have a few essential requirements, without which they can't grow into husky, healthy, profitable producers.

The first thing a pullet needs is a good ration. There are almost as many systems of feeding pullets during the growing period as there are poultrymen. Successful poultrymen have learned that to grow, a bird needs plenty of high-quality feeds. One plan which is popular with many growers is to restrict the feed. This system can be carried only so far, however. Pullets must get enough protein,

Reprinted by permission from Everybodys Poultry Magazine, Hanover, Pennsylvania, April 1950

either from their mash or grass, to support steady growth. A stunted bird never does as well as one that keeps growing from the day she is hatched until she reaches mature weight after having been in the laying pen for several months.

If your birds are on range, they must have either young, succulent grass or enough well-balanced mash to develop them properly. Poultrymen rearing birds in confinement find that pullets soon learn that their pen mates form a readily-available source of protein if there isn't enough in their feed.

A great deal of the success one has in rearing pullets depends on how closely the feeding program designed for the mash being used is followed. In recent years, many poultrymen have turned to the use of high-efficiency rations for rearing pullets, both on range and in confinement. With these rations, pullets are allowed to develop just as fast as their heredity allows them. To feed more grain than recommended or to restrict mash below the amount specified is bound to affect the birds' development.

Under a restricted feeding program, as well, it is important that the grower maintain the balance between mash and grain recommended by the feed manufacturer.

Feeds and feeding programs go hand in hand. What will work with one ration will give unsatisfactory results with another. Be sure you understand how the feed you use is to be fed; then feed it that way.

Some growers tend to be overly optimistic about their ranges. Don't flatter a poverty-grass stand on a run down field by thinking of it as a fine quality field of ladino. Poultrymen who get good results feeding only grain and minerals in addition to what the birds can pick up do so only because there are plenty of bugs and a mighty good stand of young, tender, succulent grass of high protein content. The many failures with this system can be laid at the feet of the poultryman who sees in the system a possibility of cutting feed costs and does a little wishful thinking when judging the quality of his stand.

After seeing that your birds are properly fed, provide protection for them. After they have been out a few weeks, a flock of Leghorns, particularly, may need nothing more than plenty of trees to roost in. But four-footed and feathered varmints often take a high toll of birds left to fend for themselves after dark.

Protection from the sun is essential, for birds in confinement as well as those on range. The poultryman who locks the pullets on an unshaded sunporch during the day so they'll "stay outside and get some sun," may find that they do just that—to the extreme of getting too much. A chicken, you'll recall, doesn't sweat. Her

cooling system consists solely of her breathing apparatus. When a boiling hot July or August sun catches a pullet without some shade, she'll soon begin to suffer. As soon as the temperature gets much over 100°, pullets will start to die. And many that don't die will be retarded or stunted for life.

Plenty of water, another essential, is just as important as feed. Range waterers are inexpensive. Use plenty of them, with part of them in the shade. In confinement rearing, running water is simple. On range, the problem is a little more difficult, but not overly expensive or laborious. You can plow a furrow and lay the water line in it if you don't want to bury the pipe below the frost line. When not protected from freezing, pipes must be drained each fall, though it is not necessary to dig them out each year. Many poultrymen run hoses to range, finding them easy to move, low in cost, and easy to work with.

We've all driven down a country road at 8 or 9 o'clock on a summer's morning and seen pullets still cooped up in range shelters. Cannibalism, feather picking, and smothering all result from this kind of care. If you're going to lock pullets in range shelters, as most poultrymen must, turn them out early in the morning. Don't wait until you have a costly experience before learning that chickens get up early.

In rearing pullets on platforms, see that steps are taken to control picking if it begins, keep flies down, and give birds plenty of room. For picking, either attaching any of the several anti-pick devices to the beak or vent or trimming the beak, with a knife or electrically, will do the trick. Lime, phosphate, and/or a good insecticide will control the flies. And giving the growing birds as much room as they'll have in the laying house will meet space requirements.

For birds on range, see that puddles are filled or drained so that no dirty, stagnant water is present. Give them plenty of feeders, if you use feeders. Many poultrymen feed both grain and pellets on the ground. Be sure to pick up dead birds promptly. Anyone who has lost birds from limberneck will appreciate the necessity of getting all carcasses off the range before decay sets in.

Finally, apply a lot of good, practical common sense to your rearing program. In the rush of work, don't neglect your pullets. Spend enough time with them each day to know how they are doing, and anticipate problems before they appear. If you do, you'll have the kind of stock it takes to keep egg production at profitable levels during the year ahead.

When Cows Leave Home

Condensed from Guernsey Breeders' Journal

C. R. Huston
Manager of Franchester Farms

THE reputation you get as a cattle breeder depends upon how good the cows are that carry your farm name. It is up to each and every breeder to see to it that the cattle he sells, shows, and owns are of the kind that the breed as a whole accepts as being good representatives.

Whenever you take a cow away from home for any purpose other than to take her to the butcher, you automatically assume some responsibility for the reputation of that breed of cattle in that area. This question should always be answered in your own mind before your truck leaves the farm: "Will my cattle make a showing that I can be proud of?" And if this trip leads to a fair, you should ask yourself this question: "Will my cattle have a fighting chance to be among the winners or will they be consistently at the bottom?" If you cannot answer these questions yourself, get some help; and if you finally decide that you cannot get too far away from the bottom of the class, then put your animals back in the barn—next year, after you do some more culling, is your time to show. This summer we watched a nationally advertised herd end up at the bottom of so many classes that we could not help but wonder how the next advertisement on that herd would read.

When a judge is forced by the lack of quality in a class or show to make a first or a champion out of some mediocre animal, he is not hurting himself nearly as much as he is a breed of livestock and the public's opinion of that breed. The day of filling in a county fair string of two or three good ones with a half dozen tailenders just to make a few extra dollars, is over. Keen breed competition and individual pride makes it imperative that each breeder put his best foot forward to make as good a showing as he is able. Certainly a county fair where 50 to 60 thousand prospective customers and neighbors view your exhibit each day is no place to show ill-shaped udders, sloping rumps and winged shoulders.

A broad-shouldered, neat, nice-looking chap who could well have been a future farmer or 4-H boy

Reprinted by permission from Guernsey Breeders' Journal,
Peterborough, New Hampshire, April 1, 1950

grown up, watched with great interest as the judge placed the dairy classes at one of our many county fairs. As one dairy breed after another was led out before the judge, the Guernseys finally had their turn. The two-year-old class was the largest of the day for any breed, and as they were paraded around the ring one might have gathered from watching the judge's face that he was not pleased with what he saw. After considerable fussing around, the class was lined up, the ribbons passed out, and then the fun began. The class was labelled as a great disappointment and as each animal was given her turn on the firing line, even the most unobserving person could see that the judge was concerned that any group of breeders would try to make an exhibit out of such a poor group of females. A fair board expects the exhibitors of livestock to have enough interest in the fair and their own business to exhibit only those animals that are deserving; certainly this class was not. But what about the chap who had shown enough interest to spend his whole day watching the dairy cattle being judged? As the above class was leaving the ring, he met the judge and a rhubarb started that lasted until the next group to be placed had made a couple of complete turns around the ring. What do you think happened in that conference? Well here is the story. Our friend was interested in starting a pure bred herd. He had Guernsey leanings, but after watching the two-year-old class there were some real doubts in his mind. He wanted to know of the judge if that class was typical of the two-year-olds of the breed. The judge spent his rest period and held up judging the next ring trying to protect the breeders of Guernsey cattle as a whole from the mistakes of a few.

We are in a period when farm incomes are sliding and it is going to take some hard-hitting, straight-thinking policies to keep us in business. The county fair will survive if it can give the people a good show. So many times breeders make the effort to get their animals to the fair and then neglect their exhibit while it is on the fairgrounds. Cows are left dirty, their tails not washed; they are not arranged in their stalls to look their best. Buckets and equipment are scattered all over the place, and the aisleways—where people have to walk to see the animals—are so littered with everything that one almost needs a road map to get through.

We spend money for special rations, we buy some extra good hay to keep the cows eating and in bloom, we fertilize our pastures to keep them luxuriant and full of minerals, we put money into better bulls and females, and yet when it comes time to put our best

foot forward in a sale or a show we sometimes neglect that final part of public presentation necessary to make our exhibit stand out.

In a recent meeting we heard a breeder make the following statement, "For 13 years I have been buying the cheap cows in our sales, and I have not made progress in building my herd by doing it." Not every cheap cow is a poor buy and neither is every expensive cow a good buy, but because our breed has been very much in demand we have all been guilty of passing around a certain amount of butcher bait. Next time you agree to sending a cow to a sale, just remember that after the sale is over you will have to face the purchaser and he is bound to ask you this question, "What kind of cow is she?"

A young ex-serviceman with bonus money in his pocket decided at one of our local consignment sales that he was going into the Guernsey business. He purchased two low-priced cows that were heavy with calf. He took them home and later on they calved normally with a bull calf each. One of them milked up to 22 lbs. per day and the other one finally reached a top of 26 lbs. His Guernseys were standing in a stable beside grades, the ancestors of which had inhabited that farm for a number of years.

The young man became very discouraged with his purchases because they were so inferior in production to his grades. After talking with a few of his neighbors he realized he had gone into the thing blindly and so he decided to make another try. At the next sale he purchased two of the top animals in the sale for around $500 each. One of these had a heifer calf and milked up to 40 lbs.; the other dropped a bull calf, developed a bad case of mastitis and ended up at the butcher. The first pair purchased were of the kind that never should have left home for any other purpose than to go to the butcher. The next pair were good cows and it was unfortunate that he had to lose one of them. The old sales slogan of "Let the buyer beware" still holds, but it is every pure bred breeder's individual duty to see that the number of black eyes the breed gets are kept at a minimum.

On a number of occasions we have been asked to recommend animals in a sale for prospective customers. After making these recommendations we get, too often, this sort of answer: "I bought one of that fellow's cows at this sale two years ago and she was no good. I would not buy another animal from his herd." Cattle sales are an essential part of a breeder's business and a satisfied customer is the best and cheapest advertising.

The most difficult and the most important job a judge has to do

in any show is that of placing the 4-H and FFA classes. It is a very difficult and trying business to have to tell a youngster who inherited one of the kind *that never should have left home* why his calf is at the bottom of the class. Time and again we have seen the tears come swelling to the surface and run down a youngster's face because his was placed away down in a class that he had hoped to win. In a good many instances the youngster had his animal in top shape, did a good job of showing, but the fault was with the committee or the farmer who recommended the animal in the first place.

The breed of livestock that recognizes the work of boys and girls and goes along with them will be the popular breed of tomorrow. One of the nicest demonstrations we ever saw of working for tomorrow with the small folks was put on this summer at one of our county fairs. With the completion of the judging, the 4-H and FFA youngsters, along with their parents, the cattle superintendent, the judge, and anyone who looked like he had been interested during the day's activities, were invited to an immediate ice cream social. We all gathered together in the aisles behind the cattle and were served all the ice cream we could eat. The show was discussed, the winners honored, and the losers encouraged and instructed as to how to do better. Everyone was in a jovial mood and the competing boys and girls were kidding each other as to how they stood in this show as compared to previous shows. We noticed the kids with other breeds of dairy calves watching this affair with a kind of hungry look and we had a hunch that the ice cream party would not be forgotten.

When a calf club youngster comes to your farm to buy a calf, don't look on that youngster or that sale as a chance to sell one of your poorer calves at a fair price. It is true that some youngsters with good calves fail to come through, but you cannot afford to unload on any youngster. There is no animal sold that is talked about as much as a club calf. True, it may be small talk, but small folks have a way of growing up.

This summer we were approached by the father of a 4-H boy who was disappointed in the way his son's calf stood in the show. He said, "What can I do to help my boy make a winner out of his calf? Part of the good of this business as I see it comes from the youngster getting some recognition in the shows." We went back into the barn to take a look at the boy's calf. The calf was one of the kind that never should have left the farm; her rump looked like grandpa had hit her with the milk stool, her hind legs looked

like half moons, and her head was fastened on a very short neck. The boy had grown his heifer well and she was in her Sunday clothes from the standpoint of appearance, but no amount of effort or prayer could never make a winner out of that calf. This we told the father and suggested he get his son another calf immediately.

Try to pick something for the youngster that is free from outstanding fault. No boy gets a kick out of having the judges and leaders in each show tell him something like this: "She is a pretty nice heifer if she weren't so crooked in her hind legs, so heavy in her shoulders, or so rough in her top." If she loses a close show or is down fourth or fifth in a strong show, a boy can take that O. K., but he doesn't like to be continually at the bottom of the class.

On two or three occasions we have been approached by a breeder with the suggestion that we go easy on certain calves because they came from the breeder's own herd, and he did not want the youngsters discouraged. The judge who faces a bunch of youngsters in a show ring is duty bound to be sincere and honest; if he is not free from prejudices and pressures, he should not go into the ring. The show ring is no place to cover up breeders' mistakes and the man who sells an animal should think of these things while the animal is still on his farm. When the judge finishes a class in a 4-H Show he is expected to tell the youngsters why—that is one of the ways they have to learn about the business. The mummy judge who makes his placings and dismisses the class with a wave of his hand is not doing his duty and is cheating the youngsters.

Each cow or calf that leaves your farm—other than those going to the butcher—is a living sample of the products you sell. Customers like and will pay good money for top cattle. The butcher will pay for inferior and scrap products that breeders do not want, so the decisions you make in your own barn lot will either build or destroy your reputation as a cattle breeder.

Fresh Air for Hens

Condensed from Electricity on the Farm

Prof. C. N. Turner
New York State College of Agriculture

WHY do poultrymen take pullets away from fresh air on the open range and crowd them into a stuffy building without adequate ventilation? The old trick of regulating windows, curtains and slot gadgets according to the whims of the poultrymen is never consistent. Furthermore, the weather changes very suddenly some nights.

A ventilation system where the windows are closed and the electric fan started in November and run continuously until the following March has been operated successfully now for about five years at the poultry research farm at Cornell University. The results have been most encouraging. The temperatures in the pens seem to have been entirely satisfactory. There has been no frost or moisture on the walls or ceiling, and the floor litter has not been changed during the winter season. Some dampness occurred around the watering troughs but a new water system should help solve this problem.

The most important advantage of the electric fan is a more consistent and dependable job of removing the stale, damp air.

Fan motors used for poultry houses must be capable of standing punishment. The continuous duty, 24 hours a day for about five straight months, with dirt, moisture and ammonia gases, requires a special type of motor. Cheap, shaded-pole motors often used on some small fans have not been able to take it. Most of the newer totally enclosed split phase or capacitor motors which are built for fan duty seem to be standing up very well. The units we put in the old barn at the research farm have never been serviced since they were installed 5 years ago. We have some others out on poultry farms which have been used every season for 8 years and are still in excellent mechanical condition.

Here is why the litter gets wet in so many of our laying houses. One hundred birds breathe out about 250 pounds of air containing 45 pounds, or 5½ gallons of water every day. This would be a lot of water spilled on the litter if it wasn't removed. This moisture and that contained in the drop-

Reprinted by permission from Electricity on the Farm,
New York City, New York, February 1950

pings of the flock tends to collect on top of the floor litter. Once it gets into the litter, it is very difficult to get it out again. This is the reason the continuously operated fan is better than other human controlled systems.

There are other advantages of the fan system. By removing the moisture continuously we can prevent it from condensing on the walls and ceiling and causing decay and warping of the building materials. A deep built-up litter should not have to be changed throughout the year.

Cornell Extension Bulletin No. 315 has been revised and now includes a section which describes and illustrates the important features necessary for installing the fan system. Many poultrymen say they cannot afford to be without their ventilation systems and they pay for themselves within two or three years.

Another way of putting it is this. We carry or pipe about 500 pounds of water per day into a house for 1000 laying hens. We carry about 50 pounds out in the eggs. The remainder has to be taken out by ventilation or in wet litter.

"Jet Engines"

Even smudge pots now have bowed to "jet engines."

Ready for manufacture by Marquardt Aircraft Co., General Tire's Van Nuys, Calif., subsidiary, is a proved turbojet unit designed to heat orchards, dry rugs, or perform almost any related task—within reason.

Invented by 34-year old Edward West, Jr., a graduate Stanford engineer, the turbojet will revolutionize current methods of orchard heating, William O'Neil, General's president, points out.

"One turbojet replaces 500 smudge pots," the General president explained. "Fuel oil to operate 500 smudge pots costs $500 per hour. It will cost only $2 per turbojet for diesel fuel—and one turbojet will heat 10 acres."

Mounted on a portable, rubber-tired outfit, the turbojets may be transported into orchards, placed conveniently, and started. It develops heat in three seconds to 1000 degrees, but the hot air is mixed with cold and the operator is not burned two or three feet from the jet's exhaust.

—General Tire & Rubber Company

New Era in Soil Fertility

Condensed from Missouri Ruralist

C. W. Woodruff
University of Missouri

THE present-day enthusiasm with which farmers are attacking their soil-fertility problems leaves no doubt as to the future of agriculture in the state of Missouri. The number of farmers who have produced over 100 bushels of corn to the acre on the "old gray prairies" of Northeast Missouri are now so numerous that there is no longer any question as to what a good soil-fertility program will do for the land.

Results from all over the state are much the same. Farmers on the Ozark ridge in Dent county are turning in yields of 30 to 40 bushels of wheat to the acre from land that formerly wasn't considered good farm land. The pasture-improvement program that has put Southwest Missouri on the map as a producer of dairy products is another example of accomplishments thru soil fertility on the brown limestone soils of the Ozark border. More recently the farmers from the bottom lands of the state, the cotton growers of the Southeast lowlands and the corn producers of the Missouri river bottoms have experienced the advantages to be granted thru attention to the fertility of their soil even tho they considered their land the best in the country.

What has happened to bring about these revolutionary changes in the productivity of the land?

The story behind the recent successes is one of a long struggle of experimentation and study by the Agricultural Experiment Station and by farmers who have cooperated in these studies. One of the landmarks in the developments is Sanborn Field at Columbia. This field laid out by J. W. Sanborn in 1888 has contributed immeasurably to the scientific developments in the field of soils and its value is increasing with age.

Sanborn Field was laid out at a time when many crops were being planted according to the phase of the moon, when most of the land was rich prairie sod or new ground, and when the mark of a good farmer was a well-plowed field.

Two problems which Mr. Sanborn undertook to solve were the value of crop rotations and the value of manure for maintaining

Reprinted by permission from Missouri Ruralist,
Topeka, Kansas, March 11, 1950

the fertility of the soil. At that time horses were numerous, timothy hay was needed to feed them, and large quantities of manure were available. But Mr. Sanborn realized that the fertility of a soil could not be maintained with crop rotations and manure alone. These practices did nothing more than retard the date when commercial fertilizer would have to be applied. And now the advent of the tractor has eliminated the manure-producing capacity of the horse.

Even tho fertilizer was unheard of in the Midwest at the time, Mr. Sanborn included among his studies the return to the land of the chemicals taken out by the crops. Many of these old plots now in their 63rd year are operated as planned originally by Mr. Sanborn. Other plots have been modified to include newer developments.

The early value of these plots on Sanborn Field was realized chiefly thru the effects of the different practices in maintaining the yields of the crops. The value of the field today resides principally in the changes that have occurred in the soil. From these changes it is becoming possible to evaluate, for example, the rate at which the potash is delivered by the mineral fraction of the soil, the rate that nitrogen is released from the soil humus, and the contribution of manure to the organic-matter level of the soil.

More recently deficiencies in the minor elements or trace minerals have appeared and these old plots with their past records and soil samples that have been collected regularly and preserved provide a measure of what has happened to this phase of the soil-fertility problem.

Many farmers have visited Sanborn Field and many students of the Agricultural College have learned their first lessons in soil fertility by studying these plots. Some have expressed the need for a similar field on the kind of soil in their home communities. But thru the results obtained from the old, long-continued experiments as represented by Sanborn Field, chemical tests of the soil have been developed whereby any farmer may find out the fertility requirements of the land on his own farm.

Soil-testing laboratories originally located only at the Agricultural Experiment Station are now located in more than half of the counties of the state, bringing the benefits of the knowledge gathered from experiment direct to the farmer. These laboratories are operated by the Agricultural Extension Service, which thru their country agents, are attacking the problem of soil fertility on the farmer's field. Thru this service, new developments now reach the farmer within a year whereas in Mr. Sanborn's time several years

elapsed before a new development was put into practice on the farm.

Before the soil-fertility problem was appreciated fully, the weather or the season was blamed for most of the troubles that beset the farmer and his crops. It was either too wet or too dry. Even the early scientists thought that plants obtained their nutrients from the water in the soil. One early investigator collected tons of soil in his laboratory and removed the water with tremendous hydraulic presses. This was evaporated and the residue analyzed to find out what was in the soil water that made plants grow.

He didn't realize before performing this experiment that if plants fed only from the nutrients dissolved in the soil moisture, it would require a very short time indeed for the rains to wash all of the fertility out of a soil. But scientists are persistent and thru continued research they found that most of the nutrients used by plants were attached to the surface of the clay in the soil where the water could not wash them out, but where plant roots could feed without difficulty. This storeroom on the clay is now known as "the exchange capacity of the soil." When the soil tests show that this storeroom is depleted the modern farmer takes measures to replenish it with the necessary elements.

Early workers observed the firing of corn during dry weather and set about to conserve soil moisture by cultivating to form a dust mulch.Later studies showed that corn fired not because it needed water, but because it needed nitrogen which ceased to be released from the organic matter when the soil became dry. Today we combine soluble nitrogen fertilizer with leguminous green manure crops. If it turns dry, so that green manure quits decomposing, the plants feed on the soluble nitrogen. If it rains enough to wash the fertilizer nitrogen from the soil, the abundance of moisture decomposes the organic matter so we still raise a crop.

Before the occurrence of World War II the problem of supplying crops with adequate nitrogen had become acute. The most economical source of nitrogen was that gathered by legumes from the air, so systems of soil management were built around a program of lime, phosphorus, and legumes. The program was instituted back in the early twenties but received its greatest impetus in the thirties when the Government encouraged the spreading of lime and the seeding of legumes.

By the time we were confronted with World War II the land was turning out bumper yields of crops and the stage was set for the postwar period. With adequate lime, phosphorus, and potash in

the soil, the one remaining major element that was needed, nitrogen, became available. The synthetic nitrogen plants built to supply ammunition for the last war turned to the production of nitrogen fertilizer.

Fertilizing for a good crop today is a lot like servicing a car for a long trip. We lubricate a car, fill the crankcase with oil, and the radiator with water to keep the mechanism functioning properly. We then supply the gasoline to take us where we want to go. Similarly, when growing a crop today we stock the soil with the lime, the phosphorus, and the potash required to keep the plant functioning properly. Then we supply the nitrogen to make the crop grow.

The advent of anhydrous ammonia or ammonia gas injected into the soil as a cheap source of nitrogen fertilizer is one of the latest developments in the fertilizer field. Its use may revolutionize the agriculture of the country during the last half of the present century.

Methods have been developed for handling and spreading the basic mineral elements like phosphorus and potash in bulk quantities thus eliminating the heavy labor of handling bagged fertilizer. Nitrogen applied as a gas by the fertilizer distributor also eliminates the hard labor with this fertilizer.

The close of the last half century of work again finds the Missouri farmer with the hope and enthusiasm for the future that characterized the early pioneer when he first turned the virgin sod or broke out a piece of cleared new ground with its rich fertile soil. But science is still at work delving into the little-known realm of the minor elements and their influence on the quality of the feed and the health of the animals produced from the land. Much has already been learned and with the facilities of the old plots of Sanborn Field, the modern soil-testing laboratories and the active interest of farmers, there is little doubt but that the problems of the trace minerals will soon be solved.

We recognize our soil-fertility problems, and we have learned how to correct many of them. We have renewed hope for the future of the regions of poor soils as well as for the regions of good soils. Missouri agriculture enters the last half of the 20th century with bright prospects of a healthy future.

Ways To Increase Swine Profits

Condensed from Hog Breeder

RAISING hogs is big business. But it isn't as big as it could be if you saved an average of one more pig out of each litter.

H. G. Russell and G. R. Carlisle, extension livestock specialists at the Illinois College of Agriculture, say that records show an average of only slightly more than six pigs per litter raised in that state. By averaging seven pigs per litter, you can double your hog profit.

Here are some of the ways they suggest for you to realize more profit on your hog investment:

1. Set early farrowing dates. It's almost impossible to get late April and May pigs on the good fall market.

2. Practice good sanitation; do not neglect any of the points in a good sanitation program.

3. Feed adequate amounts of the right kinds of protein. Feeding inadequate amounts of poorly formulated supplements is false economy.

4. Set a schedule for castration, vaccination and weaning. Performing these operations when the pigs are four, six and eight weeks old, respectively, will save money, prevent setbacks and keep your production program on schedule.

5. Take advantage of labor-saving devices and ideas. Many farms could save costly man labor by investing in additional feed handling and watering equipment.

6. Plan for adequate long-season pasture. Pasture will save you 5 to 10 per cent of the grain and 35 to 40 per cent of the protein supplement compared with drylot feeding.

7. Market at the peak season of prices. This involves timing the production program to have pigs ready to sell on seasonably high markets. The difference between August and winter markets this past year was from $6 to $8 per hundredweight.

8. Save more pigs per litter. You need about five pigs out of each litter to break even. Each additional pig brings you that much more profit.

9. Use a sound basis for selecting your brood sows. One good way would be to mark gilts from good litters of young pigs.

10. Realize the importance of the swine business. Neglecting the small tasks in a large swine business can cost you just as much as neglecting some of your crops.

Reprinted by permission from Hog Breeder,
Chicago, Illinois, April 1950

Preservatives for Grass Silage

Condensed from American Agriculturist

H. L. Cosline

YEARS ago when grass silage was tried at intervals, one of the chief disadvantages mentioned was the strong smell which the silage usually developed. Realizing that grass did not contain as much sugar as corn, various experiments were undertaken to find a possible material to add to grass silage to improve quality by increasing acidity.

After some trials, phosphoric acid was recommended, but at present we do not hear much about it. At the New Jersey Experiment Station cows were fed on grass silage which had phosphoric acid added when it was put in the silo. They ate large amounts of silage but tests indicated that the urine was so acid as to make heavy feeding of this silage inadvisable.

During the war when it was difficult to get molasses, putting up silage by the wilting method was recommended. This consisted only of allowing the grass to remain in the swath after cutting until the moisture content was about 65%.

Some good silage resulted, especially where the percentage of legumes in the mixture was not too high. However, some definite disadvantages developed. For one thing it is practically impossible for anyone to judge accurately the degree of moisture in grass. If grass were allowed to wilt too much, mold would develop in the silage with a loss of nutrients and palatability. If it was put in too wet an objectionable odor frequently resulted. This objectionable odor comes from the development of butyric acid which is the same substance that you find in rancid butter.

Many a dairyman has questioned the advisability of putting up grass silage because in some cases, milk, which everyone knows absorbs odors easily, was returned from the station because of off-flavor.

As a result of the lack of uniformity in making silage by the wilting method, most authorities now recommend the use of a preservative as an insurance factor. Two materials commonly recommended now are molasses, at the rate of 100 pounds to the ton, or ground corn and cob meal, hominy, or some form of grain at the rate of 300 pounds to the ton.

In a recent discussion about grass silage, John Babcock made the following suggestion. Where

Reprinted by permission from American Agriculturalist,
Ithaca, New York, April 1, 1950

grain is used as a grass silage preservative it is just as effective to spread the grain on the bottom of the truck as it is on the top of the load if the truck is fitted with an unloader. Most unloaders have a false front on the truck which is pulled backward by a motor and it is easy to see that the grain is mixed just as well when it is put on the bottom of the truck as it is if put on the top of the load. The only advantages of grain over molasses are that it is often available right on the farm without cash cost, and in many cases it is less messy to add to the grass silage.

A number of different ways of adding molasses have been tried. The simplest is to put the molasses in a barrel or tank above the silage blower or cutter and run in the molasses as the grass goes through. The amount to apply can be determined by checking the time that it takes to run a ton of grass through the cutter or blower and checking the time which is required to run a given weight of molasses on the grass. The one trouble is that molasses will run more slowly as the temperature gets colder. To offset this it has been suggested that molasses could be kept in an air-tight container and that a compressor, which is now found on many farms be used to compress the air in the tank above the molasses.

It is also necessary to turn off the molasses just before the last grass in a load goes through the blower, and to turn it on only after the next load has started to go through the blower, otherwise you may clog your delivery pipe.

Pumping molasses to the top of the silo and adding it just as the grass is blown in, has been tried. Two disadvantages here are: First, that this setup costs more money; second, there is serious doubt that the molasses is adequately mixed with the grass. This whole problem of ease of adding molasses is being studied and new developments will be reported from time to time.

The newest method of insuring good quality grass silage is to use sulfur dioxide. This is a gas which comes compressed in cylinders. After a foot or two of silage has been added to a silo the gas is introduced through a pipe connected to the cylinder and pushed down a foot or so in the silage. A valve is opened and the amount of gas added is figured on the basis of the time element. Last fall, I saw two lots of silage at Montrose, Pa., on a farm which has been operated on an experimental basis by the Pennsylvania State College of Agriculture. One lot had sulfur dioxide added and in the other, grain was used as a preservative. Both lots were excellent. There was not the slightest objectionable odor.

The silage where sulfur dioxide had been used was greener and a

test on 10 cows which ate this silage compared to 10 others that ate the silage containing the grain showed that the ones eating silage with the sulfur dioxide produced slightly more milk. Whether or not the increase was significant remains to be seen from further trials, but certainly so far as I could see, and apparently so far as the cows could judge, the silage with sulfur dioxide was equal to or better than the other.

There is the possibility that continued long-feeding of heavy amounts of this silage containing sulfur dioxide might show harmful effects on the cows. However, there is no reason to expect that it will. In general, state colleges in the Northeast are willing to say that this method shows promise but they are not willing to give it a whole-hearted recommendation until they have experimental evidence to back up their statements.

If Calves Could Talk

Condensed from The Ohio Farmer

W. D. Pounden and John W. Hibbs

IF only calves could talk! It would simplify matters and help reduce calf sickness. Even if they could talk this still would not make it possible for all upsets to be avoided. For one thing, the care their dams have received while carrying them plays a big role. You can expect trouble when the dam has had only poor roughage to consume. Calves from such dams may be weak or die within a couple of days.

Certain steps will help the newborn calf off to a good start in life. Should it be slow to show signs of life, clean the mucous out of its mouth and help it to start breathing. A few gentle squeezes over the ribs may be given with each followed by a quick release. Rub the calf briskly with straw or a gunny sack.

It is good herdsmanship to see that the calf gets some colostrum very shortly after birth. Without such early feeding and drying-off life may be difficult for some calves, especially during cold seasons.

Usually it saves time to milk a pound or two of colostrum and hand feed the calf even before it thinks about trying to get up on its feet. At this time calves will suck one's fingers when colostrum is trickled down along them. A few moments later some calves become so set on trying to get up that they can only be fed with difficulty.

Reprinted by permission from The Ohio Farmer,
Cleveland, Ohio, April 1, 1950

Colostrum gives the calf its first health-protecting factors after birth. It has more ability to take advantage of them during the first day or two than later. Care should be taken that the calf has a chance to get plenty of colostrum at this time.

An important factor in the health of ruminants is proper rumen function. Until this gets under way the young calf relies to a great extent on the milk it drinks as a partial substitute. Adequate consumption of good quality roughage is probably the most important factor in promoting good rumen trouble function. If you're having health trouble with your calves, first make sure they are eating plenty of good roughage.

The calves may be given lots of good quality legume hay and little or no grain during the first few weeks of age. Rumen inoculations with cud materials from mature stock can be given in order to provide the better varieties of rumen microorganisms.

Many herdsmen report trouble with infected navels among their calves. Unfortunately it is seldom that the infection involves only the tissues located next to the skin. Abscesses near the exterior are of minor importance because they can be drained. It is trouble up in the body along the vessels which formed part of the umbilical cord which cause serious conditions. The toxins formed in these deep abscesses are absorbed into the body and symptoms of toxemia such as droopiness and loss of appetite result.

The logical approach is prevention. Most infections can be avoided by dipping the navel cord and surrounding skin in tincture of iodine at birth. A wide-mouthed bottle containing an ounce or so of iodine may be used for the purpose. Put the navel cord into it while pressing the bottle against the skin, and up-end the bottle in order to treat the surrounding skin at the same time.

It is sometimes difficult to spot the causes for troubles among the calves in individual herds. Frequently extreme temperature variations, damp bedding, chilling by exposure to drafts and faulty feeding practices can be blamed.

A study of the problem in one herd showed that every one of the periods during the winter and spring when several of the younger calves were affected were associated with sudden drops in outside weather temperature. The differences between two other herds further showed the need for care in preventing exposure to these conditions. The owners had similarly-bred herds, interchanged animals quite frequently and fed their calves in the same way. One repeatedly had serious outbreaks of diarrhea among the calves while the other was practically free of such trouble.

A check of the premises showed that the calves in the latter herd were kept in a sheltered wing of the barn up against the hay mow, where temperature variations were moderate and drafts almost non-existent. The opposite was true of the other barn. Relocation of the calf pens and more care in preventing exposure of the calves were called for. Drafts occurred when the main doors of the barn were thrown open on cold mornings.

It is certainly logical to provide a shivering calf with a blanket or a gunny sack cover. The change for the better in such a calf is often dramatic from this small action alone. Lightweight covers put on young calves during chilly periods are helpful under many housing conditions. This is especially true with calves of the smaller breeds.

Our choice of a cover is one of our own design which is made of lightweight canvas duck. It can be quickly and easily slipped over the animal's head and held in place by canvas straps and snaps. The advantages to the calves and the ease of handling and cleaning the ready-made covers soon return more than their cost.

Profit in Sow Fattening

On a good ration thin sows will put on weight, and often make more money for the feed they eat than growing pigs, according to Gus Bohstedt and R. H. Grummer of the University of Wisconsin. Up-grading on the market for the better finish on fattened sows is as much responsible for the profit from feeding sows heavily as is the increase in weight.

In their trials, Bohstedt and Grummer fed three lots of hogs, two of sows and one of pigs. A lot of sows on an 11% protein ration gained two pounds a day at a cost of $14.44 per hundred pounds. Another lot fed a 14% protein ration gained 2 1/2 pounds a day at a cost of $12.76 per hundred. The growing pigs gained 1 1/3 pounds a day at a cost of $12.65 a hundred.

—The Farmer

General Farms Are Obsolete!

Condensed from Successful Farming

Louis Bromfield

WHEN we took over the worn-out fields at Malabar, we set up a plan based upon a 4- to 5-year rotation of wheat, oats, corn, and grass. We planned a general farm, including beef and dairy cattle, hogs, sheep, chickens, and a high degree of self-sufficiency.

It was a program advocated by all Midwest state agricultural colleges. Undeniably it had its virtues, particularly during the nineteenth century, when there were few, if any, telephones or fast freight trains, and no automobiles and no airplanes—when distribution of farm products was limited, and indeed primitive.

I confess. The self-sufficiency angle had a deep,traditional, and somewhat romantic appeal for me. During the war, when poultry, meat, cream, and butter became scarce—or at times unobtainable—the program paid off well. But those were conditions of wartime, when to some extent all of us lived under frontier conditions. They were by no means normal.

The 4-year rotation general farming plan stumbled along fairly well for a year or two. Then, slowly, we began to realize that we were not making much headway.

We found we were doing a great deal of running around. It took too many man-hours and too many different conditions of fencing and housing to maintain any considerable numbers of livestock of such variety. The dairy barn was no good for hogs, nor would the ordinary fences contain them. The chicken housing required a great deal of remodeling. The sheep had a tendency constantly to migrate through fences. They always headed toward the high ground, which was usually our neighbors' territory. The 200-tree apple orchard was actually a liability. It was not big enough to pay its way.

I believe the general farming 4- or 5-year rotation plan, which we tried to follow, means unjustified high capital investment in machinery, a great deal of man-hours spent in running around. In general, it means long hours and hard work for low profits. It is my own belief that the 4- to 5-year rotation general farming plan is obsolete.

It was necessary on the frontier—and it was justified during the period when agricultural experts sought to break down the old, greedy, cash-crop pattern of farm-

Reprinted by permission from Successful Farming,
Des Moines, Iowa, April 1950

ing. But it no longer fits into the pattern of our times. We now live in a country which is highly industrialized. Our agriculture is highly mechanized. Distribution is widespread and at least mechanically efficient. In these circumstances, total self-sufficiency is out of place and perhaps even an economic mistake.

What we discovered—the hard way—was simply that we were trying to farm during the twentieth century in terms of the nineteenth, when both labor and time were cheap and little planning was necessary. Then, there were still in existence two ideas which were profoundly false: (1) that anyone could be a farmer; (2) that in order to be a good farmer a man had to kill himself with work.

The first idea—that anybody can farm—has cost this nation billions of dollars and produced in its day the "hick," who became a symbol of all farmers and the butt of vaudeville jokes. This idea destroyed hundreds of millions of acres of land, for which we are paying every day in higher and higher food costs and higher and higher taxes.

As to the second idea, the good modern farmer is the man who uses his brains and the knowledge available, instead of his muscles. The brains and the knowledge mean high profits, high living standards, pride, self-respect, and dignity.

In the beginning, our program had been determined somewhat by the character of the land, the low yields per acre, and the problem of getting *some* income. We carried some 200 head of sheep to utilize the poor hill pasture. We bought Shorthorn cows, which we crossed with Angus bulls, to breed blue-roan calves which we put on what good pasture we had.

We know now what every good farmer knows, or must find out—that poor land and poor fields never make any money for anybody, no matter what the program.

The sheep did fairly well. The Shorthorn cows gave enough milk to bring up good, hardy crossbred calves, which utilized the moderately good pasture probably better than purebred calves would have done. But they didn't make us any money, principally because the forage was so poor that it required too many acres to carry them.

We know now that if we had borrowed the money, limed and fertilized the whole place, put it down into legumes, and then begun our livestock program, we should have lost a great deal less money.

We had also to learn that corn was *not* a more profitable crop than heavy legumes and grasses but, generally speaking, a *less* profitable one, in our area.

Gradually, we began to produce less corn, more good grass. As we did so, the rising profits began to

show up on the farm books—principally in the money we did not have to spend, the man-hours we did not need, and the machinery we did not have to buy.

For three years now, we have not raised any wheat. Our rotation has been from heavy meadows of bromegrass, alfalfa, and Ladino clover, into spring barley or oats and back again into alfalfa, bromegrass, and Ladino.

Now we plan to go one step further. In the meadow seeding, we have tremendously heavy first cuttings, most of which we put in the silos. There is a surplus, however, which in the past we have been making into hay. This is an extremely difficult job, owing to the heaviness and lushness of the first cutting. It is difficult or almost impossible to cut properly and is often subject to wetting during late May and early June. In the future, we are using this excess first cutting for bedding.

There are many advantages to this, both economic and otherwise. It does not matter whether the hay is wetted or not. If it is in good condition, the cattle will eat large amounts of it as roughage while it is being used as bedding.

After much calculation, we find that even though we could get a good price if we sold this excess first-cutting hay, we shall actually make money by cutting out the fitting operations, gasoline, and higher fertilizer costs of raising a nurse crop for a new seeding. In other words, our only operation will be the trash mulching of old seedings in which the legumes have been crowded out, in a single once-over operation.

This means that the operation will be done sometime during the late summer, and that the next spring we will be harvesting hay off the same field without the intervening year given over to a nurse crop.

Gradually, we have moved into a streamlined farm program. As we have done so, labor and fertilizer costs, and man-hours, have declined rapidly. So have feed costs and capital investment in machinery and buildings.

Our carrying capacity, winter and summer, of cattle has increased from the original 30 head which could barely get through with the feed raised in the first year or two to a capacity of from 275 to 300 head.

Most important of all, we have been able to prove that an acre of our land sown to alfalfa, bromegrass, and Ladino brings in the same gross in terms of cash as that of the corn farmer who raises 90 to 100 baskets an acre. Less than 5 percent of the farmers growing corn in the United States raise as much as 90 baskets of corn to the acre. Moreover, our net profit is many times per acre that of the corn farmer. Compared with the corn farmer's costs, heavy grass

costs us approximately one-seventh as much in labor and one-fifth as much in fertilizer.

We buy no protein supplements or concentrates at $100 to $120 a ton, as we manufacture sufficient protein for dairy cattle and beef feeders out of sunlight, air, and water, through our legumes. Except for bonemeal, fed as a precaution to the cows being milked, we have bought no minerals for the past two years. The cattle apparently are getting all the minerals they need out of the forage from our *deep-rooted* legumes and grasses, and seldom approach the boxes where minerals are fed at free-choice.

We have fed, until this year, no grain to any animal on the farm except the cows in the milking parlor, and then only a maximum of 5 pounds a day to the heaviest producers.

Our grass silage costs us one-seventh in labor and one-fifth in fertilizer what corn silage cost us in the past. The same acreage of grass as of 100-bushel-to-the-acre corn will fill a silo with grass silage. We shall have in the silo at least 25 percent more roughage feed, because the grass packs so much more tightly. The quality of feed is much higher than corn silage. By experience, we know we take from 5 percent upward more milk off the grass silage than off the corn silage.

It is necessary, I think, to explain the low cost of grass silage as against corn silage. We run the heavy mixtures of bromegrass, alfalfa, and Ladino on the same land for a minimum of 6 years, some of it as long as 10. Those fields are plowed only when the bromegrass, going wild on the free nitrogen released by the legumes, finally crowds out the legumes themselves.

During that period of six years and upward, the *only* labor and the *only* fertilizer expenditures are the top-dressing of the field once every three years with 250 pounds of 0-12-12 or 0-20-20 commercial fertilizer, or two top-dressings of barnyard manure. We have some seedings producing heavily after six years in which the only labor has been riding the manure spreader over the field twice.

Beginning in 1949, we started another practice which carries our streamlined farming one degree further. We have cut out all dry grain feeding by putting the whole grain into the grass silage as we filled the silo. The program is a simple one. To begin with, we make our grass silage with a baler in this fashion:

A side delivery rake is attached to the mower and the heavy grass and legumes are mowed and windrowed in a single operation. When the mixture is sufficiently wilted, we bring in the one-man pickup baler, disconnect the tying ap-

paratus, and run it along the windrow about 7 or 8 miles an hour.

The slice baler picks up the grass, chops it into slugs of convenient size, and pushes it onto the wagon attached to the baler. Working on the wagon, a boy can build the load by piling up the slugs of grass like bricks. There are no ropes of hay and there are no *heavy* slugs; they are all the same.

The wagon is then driven to the silage cutter where a wagon of whole grain oats and barley from the previous year's crop is waiting. While the grass is thrown into the silage cutter, the grain is shoveled in with it and the winter grain feeding is done. Not only is it done, but it is better feed than if ground and fed dry.

After streamlining crop production, it became evident we needed a streamlined livestock program—one which would give us the greatest benefits and profits on the basis of grass, legume, and small grain farming.

This did not form itself at once. It came about through general evolution in which many things had to be considered, not the least of which was our limited cattle shelter and feeding barns, and their old-fashioned construction. They were conceived and built in the days when labor and time were cheap. As with the average farmer, the changes had been made slowly and conservatively, many of them with our own labor and materials. But by replanning the big and high, old-fashioned bank barns, we were able to cut labor and manhours by at least 50 percent.

The biggest barn was converted into a combination loafing shed and milking parlor, with hay and straw storage directly overhead, so that both could be fed directly to the cattle through trap doors or open feeding racks extending to the second floor. This arrangement meant merely cutting the strings on the bales of hay or straw and allowing gravity to carry them downward. The other barns were remolded in a similar fashion, save that there was no milking parlor.

The cattle program went through many changes from the original combination of beef and dairy cattle, until the beef cattle were eliminated entirely.

At the present time, we bring in carloads of Holstein heifers, bought in Wisconsin, Minnesota, or Canada when the prices are low in the late autumn. These are turned in, at breeding age, with Angus bulls.

We take from the heifers a calf and a year's milk. Then we resell them as second-calf heifers for 2½ times or more what we paid for them, carrying them meanwhile on excellent heavy pasture in summer, and in winter on good grass and legume silage and hay.

The operation is a comparatively simple one, with a high degree of flexibility. When we have a

heifer which is wild, a hard milker, or a low producer, we do not bother with her in the dairy. We turn her out on good grass, as a nurse cow to two calves.

At the end of the year, she delivers to us two calves which have cost us, directly, zero in protein supplements and grain, zero in calf feeds, zero in bucket feeding or labor of any kind, and zero in sickness. In some cases, the profits on the two calves are higher than if we had taken the heifer into the milk parlor.

If we have more calves than nurse cows to care for them, the calves are sold as veal, and at the end of the season—about November first—all calves from weekolds to 400- and 500-pounders are sold off, and the stage cleared for the new heifers.

Calves born during the winter are doubled up with nurse heifers and given a creep, where they can learn to eat silage and hay. In the spring, they are turned out with their mothers, on pasture.

When we have an exceptionally fine producer, we do not sell her but keep her for our milking herd, thus building up a top-quality producing herd much more rapidly than we should be able to breed such a herd.

The breeding and resale of heifers at 2½ times what we paid for them, plus a calf and a year's milk or two nurse calves per heifer, represents a rapid turnover of capital. The calves, when sold each November 1, represent a cash crop fully as much as a crop of wheat or corn. And they are considerably more profitable in the short as well as the long run of soil building and steadily increasing fertility. Meanwhile, a fat milk check keeps everything going—a consideration every farmer can heartily appreciate.

I am aware that the conditions which made possible a streamlined program at Malabar are by no means universal. The pattern, however, will apply in one way or another to most of the vast Cornbelt and the whole of the South.

Such efficiency, with better regard for the soil and for grazing lands, can increase our wealth and lead to an easier life for all of us—a life not dependent upon government handouts, but upon a sound and a profitable agriculture.

721 Pounds Butterfat Per Cow

Condensed from The Maryland Farmer

Vincent Sauchelli

ARE you getting 721 pounds of butterfat per cow? It is a fact that Hominy Hill Farm in Freehold, New Jersey, is getting that much according to Dr. Carl Bender of the New Jersey Agricultural Station. A few years ago this same farm was just one of the average general farms in the Northeast which carried some grade stock, grew some average feed and roughage for them, and raised a few acres of canning crops for a little sideline, and the owners just made a living.

What caused the transformation from average to way above average? That makes an interesting story carrying inspiration to all farm folk in this part of the country.

The soil on the 450 acre farm runs from sandy to impervious clay and all gradations in between. It was rated poor to "sorry" and had its big share of poverty grass and poor yields of corn. Three acres of pasture were needed to carry one head. Six years ago one 24-acre field had eleven heifers. These had to have a supplement of hay and grain to keep them from starving. This past year that same field carried 24 heifers each of which got all the feed it needed right off the field and developed an excellent condition.

What was the magic used that changed this farm?

Good management, sound fertilization, better pasture mixtures, all thoroughly mixed with lots of tireless work. The land was first clean tilled to destroy the weeds as much as possible. The soil test had shown the field was acid; therefore it was limed to bring the pH up to 6.8, almost to the neutral point. Some fields required as much as 6 tons of limestone per acre. Enough lime was added not only to correct acidity but also to provide a good supply of calcium with which to feed the crops. Having gotten the fields to a pH of between 6 and 7, it may not be necessary to lime again before four or five years and then only at the rate of about one ton per acre.

Next, each field was studied to determine what should be the best forage mixture to seed. Soil type, drainage, and slope of land were the main factors. For the farm as a whole it required about six different mixtures. There was tall oat grass for the light soils; Reeds canary grass for the heavy, tight

Reprinted by permission from The Maryland Farmer,
Baltimore, Maryland, March 1950

clays that were inclined to stay wet, and orchard grass, brome, and timothy. Alfalfa, Ladino clover and alsike and red clovers represented the legumes.

The fertilizer program was also tailor made for each field. They made sure that enough nutrients were applied to sustain high yields. On a 50-acre field for alfalfa they applied 600 pounds per acre of 0-12-12 in the fall and the same amount in the spring. After the first cutting, they applied 300 pounds per acre of 3-12-6. This same treatment was given after the second cutting. After that each acre received every year a dressing of 800 pounds of 0-12-12 until 1948, when the fertilizer was changed to 600 pounds of 0-19-19 with borax. In fact, this amount of 0-19-19 with borax fertilizer was applied on all mixtures centering around legumes either in the late fall, early spring, or part in the fall and the remainder after the first cuttings.

That is a lot of fertilizer per acre you may be saying to yourself. In the driest year ever experienced in that country a 50 acre alfalfa field produced five and a quarters tons of alfalfa. That is a record yield for the Northeast and shows what can be expected from a lush growing, well fed, vigorous crop. Those alfalfa tap roots had enough energy to be able to go down deep enough to reach water so that the drought did not bother the crop at all.

Dr. Bender tells how he was curious to see what that alfalfa would do in a wet year. Ordinarily this area in New Jersey gets about 45 inches of rain per year. He found that in wet years the yields go up about two to one; in dry years four or five to one. In other words, a field with a high fertility level gives a quicker pick up after any rain than otherwise, no matter how small that rain is. He also found that on a heavily fed field it was better to apply the fertilizer after the first cutting of the alfalfa in the spring rather than in the late fall. This resulted in stimulating heavier second cuttings. If silage was to be made, then the fall application might be justified.

As in the case of all productive fields, the factor of success which outranks all the others is managerial skill. That factor was applied here in handling the pastures. The mowing machine was never out of use on this farm. Most fields are clipped 6 times a year to check weed growth, and to keep the forage young, tender and nutritious. The farm now has 85 purebred Guernseys milking and they make 1000 quarts a day. In 1948 the test herd comprised 15 two-year-olds and it averaged 14,343 pounds of milk with an average butterfat content of 721 pounds. The entire herd including

dry cows averages about 9000 pounds a year with average butterfat of 5.1 per cent. Remember, the only feed besides grass silage, pasture and hay is a 12 pounds fitting ration per day.

Here is a fine illustration of what good management and wise fertilization can accomplish in the Northeast. If such an average farm as Hominy Hill in New Jersey can be transformed by such a formula into one of the most profitable and satisfying enterprises, then there is not much excuse for not following that remarkable example elsewhere in this region. Hominy Hill is not a unique and rare experience in these parts: We have many similar developments in New York State and New England to match it. Most poor farms are farms whose crops are making only 10 per cent of a poor living because they are starving on depleted, eroded, overcropped land. To make a big crop you have to feed it liberally. As Dr. Bender puts it, in relating this story of Hominy Hill, he would always be willing to spend $7 for fertilizer (the cost on this farm) for a ton of hay selling at $50, and would still be willing to invest in the fertilizer even if the hay were selling at $20. More skill is needed as milk prices drop if the dairyman is to do better than break even.

Corn Drug Relieves Arthritis

Condensed from The Wall Street Journal

Sydney B. Self

CHEMISTS have come up with another super-drug made from corn syrup. It's glucuronic acid.

Doctors find that the drug will relieve arthritis, sciatica and other forms of "rheumatism" in some cases. These diseases are the joint and muscle pains that afflict some seven million Americans.

The new drug won't cost nearly as much as the other arthritis fighters that have been making the headlines recently. It's expected to sell for around $1 to $2 a gram, compared with $150 a gram for the hormone, cortisone, for instance. Glucuronic acid will be much more plentiful than these drugs, too.

Doctors have already run a series of quite successful tests on people with rheumatic diseases.

Of 50 patients treated with the drug by a team of physicians of Misericordia Hospital in New York City, nine were apparently cured and 19 showed major improvement.

In another series of tests on 256

Reprinted by permission from The Wall Street Journal, New York City, New York, December 31, 1949

patients, about a third improved "markedly"; another third improved "moderately."

The doctors are keeping their optimism under control, however. There's a lot more testing to be done, and glucuronic acid isn't expected to provide miracles. But it has the medical profession interested because it may provide another important key to the complex mysteries of bodily chemistry.

Some chemist-doctors have hopes that glucuronic acid may help counteract some bad side-effects of large doses of sulfa drugs, streptomycin and neomycin, used to treat tuberculosis. Sulfa drugs sometimes cause nausea; streptomycin can bring on deafness.

There are indications, too, that a combination of glucuronic acid and streptomycin is more effective than streptomycin alone in combatting dysentery and other intestinal infections.

Actually the drug isn't new. Chemists have known about glucuronic acid for a long time; it's one of the most important chemicals manufactured in your body. They've suspected for some time that it could be used to fight disease but have never been able to make enough to do the needed testing. It's been too expensive to produce.

Now a commercially-practical method of making glucuronic acid from corn glucose has been developed by a team of over 30 research chemists in the laboratories of Corn Products Refining Co. The team was headed by Dr. Neal E. Artz and was under the supervision of Dr. A. L. Elder, the company's research director. This is the same team which a year ago brought out the vitamin inositol, now being tried out on diabetes and heart trouble.

Commercial Solvents Corp. will begin selling the drug early next year under the trade name Glucurone. Almost all its 50-pounds-a-week output will be allotted to doctors and research laboratories. Production can be expanded fairly quickly to meet any potential demand, company officials say. Two company scientists, Drs. Lawrence W. Smith and George W. Mast, have directed the clinical medical studies on glucuronic acid.

Doctors say that drugs won't "cure" rheumatism and arthritis in the way penicillin cures pneumonia. Penicillin licks pneumonia by killing the germ that causes the disease. The so-called degenerative diseases—like arthritis, other rheumatic conditions, heart trouble, and diabetes— aren't caused by germs so they can't be "cured" in the same way.

The theory is that these diseases are caused by some breakdown in the gland system which brings about a lack of some essential material in the body. Sometimes the condition can be corrected by

treating the patient with drugs. People with diabetes, for example, must be given insulin because their glands don't produce enough of it.

One reason why scientists are watching the new drug with interest is an experiment performed by Dr. W. F. Goebel. He was able to immunize mice against pneumonia by the use of artificial serum containing glucuronic acid. Synthetic chemicals have been known to cure disease—the sulfas, for instance—but this is the first known example of a synthetic chemical producing immunity to disease.

Serums are normally made from the blood of animals that have recovered from a disease and acquired immunity by building up some sort of resistance agent in their blood. It's too early to jump to any conclusions from this experiment, however, scientists caution.

Sheep Lead Profit Parade

Condensed from Cappers Farmer

George A. Montgomery

FARMERS in the Corn Belt are starting to rebuild their sheep flocks. While pork and beef prices were going down last year, mutton and lamb held about as strong as in 1948. That alone would spur demand for ewes. But there are other reasons why farmers want to get back into the game. Sheep numbers skidded from 56 million in 1942 to less than 32 million in 1949. Liquidation went so far that the comeback is certain to be slow. That should insure good lamb prices for several years. Then there is the cut in grain acreage. It will force farmers to grow more grass. The best way to profit from grass is to turn it into meat. Sheep use roughage to advantage, so they are logical users of part of the forage grown on land taken out of grain. Already flocks are leading the profit parade on many farms in the Middle West.

Records kept by Fabian Haas, Woodford county, Illinois, show that for each $100 worth of feed consumed last year, ewes and lambs returned $254; swine $148. Subtract feed cost, and you have $154 for sheep; $48 for hogs. That's a 3-to-1 edge for sheep. One reason for the wide difference

Reprinted by permission from Cappers Farmer,
Topeka, Kansas, April 1950

in net income obtained is that sheep numbers are the lowest in 70 years, while swine numbers are at a record peacetime high.

Sheep are giving a good account of themselves in other states, too. Everett and Herschel Shonk, Rush county, Indiana, sold 85 lambs from 50 ewes in 1949. They averaged 92 pounds, and grossed $2,015.62. Wool increased returns to $2,228.47, an average of $44.57 a ewe. The previous year each ewe brought in $43.19. The Shonks paid $17 apiece for 40 whiteface ewes in 1946. They added 20 blackfaces at $22 a head the next year. These prices looked high compared with those of 10 years before. Apparently they were not too high, for these ewes have been making a higher return on investment than any other livestock the Shonks own.

Lambs and wool from 91 ewes grossed Hill Brothers, Eaton county, Michigan, $2,964 in 1949. That is $32.22 a ewe. The project required less labor for each unit of income than any other on the farm. A 144-percent lamb crop was saved. Returns were $36.84 a ewe in 1948, when a 161-percent crop was sold. Lambs were finished without grain on alfalfa, clover and brome-alfalfa pastures. Ben Seely, Hillsdale county, Michigan, raised 70 lambs from 42 grade ewes in 1949. When lambs, sired by Suffolk and Shrop rams, were 4½ months old they averaged 78 pounds. Value of mutton and wool produced was $35.23 a ewe.

Whiteface western ewes are the best bet for market lamb production on a general farm, Rufus Cox, Kansas sheep specialist says. They are hardy. They milk well, yield good fleeces, and produce lambs of satisfactory quality when mated to good mutton-type bucks. But they are hard to get right now. The range sheep business is based on that kind of ewes. Liquidation hit ranchers, too. They need bigger flocks, and they are hanging on to tried ewes as long as they will produce.

Some farmers in the Middle West have concluded that they stand little chance to get into business with a band of wool-breed westerns. They are adding range-bred blackface ewe lambs to their flocks. Dana Pigg, Sullivan county, Indiana, says he would rather have Suffolk-Corriedale crossbred ewes than any other kind. He mated 75 with a Southdown buck. Thirty Hampshire ewes were bred to a Hamp ram. Every comparison favored the 3-way crossbreds. Hampshire lambs were so big in head and shoulders that 6 ewes were lost at lambing time. Not a crossbred died. The Hampshire lambs were a little older, but they did not finish as soon. Only 2 Hamps were in the first load sold, and they brought $2 a hundred

less than those from crossbred ewes.

Henry Mayo, Purdue sheep specialist, believes blackface westerns should prove just as profitable as those of the wool breeds. He says their fleeces may not be as valuable, but he believes that deficiency will be offset by larger and better quality lambs.

Lespedeza and ladino clover, which have come into wide use, make sheep the ideal livestock for a lot of the Middle West's rolling land. When bluegrass and timothy were the main pasture crops on thin soils, top sheep men lambed in late winter. If they delayed, grass became low in protein before lambs were fat, and they had to finish on grain.

Those with lespedeza and ladino can fatten lambs on pasture any time in summer. Dean McCollum, Linn county, Missouri, lambed March 15 to April 15 last year. Korean lespedeza was ready to graze before bluegrass hardened, and his 110 lambs continued to gain. By late September they averaged close to 90 pounds. The best were so fat they waddled. The previous year, McCollum sold 121 lambs from 86 ewes.They averaged 87 pounds. All their gains were made on pasture and milk. Mutton returns were $31.21 a ewe.

Lewis C. Hardin, Hancock county, Indiana, also produces mutton and wool without grain. His lambing starts in late January and continues into March. Rye and wheat are ready to graze by the time the last lambs are dropped. The flock stays on small grain until late April, when ladino is ready. From then until October, or later, the sheep get no feed but ladino.

Hardin followed Mayo's advice about blackface ewes. Blood of his flock is 50 percent Hampshire, 25 percent Rambouillet. Fleeces averaged 9 pounds, and brought $4.23 each.

It is hard to keep ewes from getting too fat when they stay on ladino after lambs are weaned, Hardin says. He believes he would get a bigger lamb crop if they had coarser feed from the time lambs were weaned until a couple of weeks before rams are turned in. He feeds alfalfa-ladino hay in winter—but not all the ewes want. They go into the fields to get exercise while hustling the rest of their food.

New plastic control methods make sheep more attractive than when flocks had to be drenched frequently. Most growers mix phenothiazine with all salt fed. Haas avoids drenching by changing pasture every 2½ weeks.

Save Surface of Soil

Condensed from Better Fruit

Dr. R. E. Stephenson
Oregon State College

NORMAL geologic erosion is associated with the weathering of rocks, the leveling of slopes, and the distribution of materials which later become soil. In making soil from a partially weathered mass of minerals, nature employs a vegetation cover which pierces the depths with roots, drops litter on the surface and supports a myriad host of living organisms which finally convert the dead plant remains to humus.

Minerals, humus and organisms are essential components of all good soils. Humus and organisms are concentrated in a comparatively shallow depth—the soil which supports crops.

When this top layer of earth known as soil is lost by destructive erosion, called normal geologic erosion, the productive capacity of the land is impaired more or less seriously according to the extent to which erosion has occurred. The top foot of soil has a higher crop production value than the second foot, in fact with the top foot gone, it is not uncommon to have the land rendered nearly worthless for cropping.

To distinguish properties which make raw subsoil infertile and the surface layer highly productive, several changes which take place in the process of soil making must be considered. The raw mineral subsoil lacks humus, and the essential population of living organisms, but it lacks also the structural granulation, and pore space development that results from the action of plant roots, and the presence of humus and the organisms which it supports.

Due to lack of large pores, there is poor aeration, therefore lack of oxidation processes that destroy toxins and change element combinations to forms that plants can use.

In one soil for example there was 25 times as much water-soluble potassium in the surface foot as in the sixth foot, and for calcium 35 times as much in the first foot. Humus was distributed somewhat the same way with nearly 10 times as much in the surface as in the sixth foot. Loss of two feet of this soil would have taken the major portion of the humus and soluble nutrients in the entire soil profile.

Reprinted by permission from Better Fruit.
Portland, Oregon, February 1950

These undesirable changes which are brought about by erosion are largely due to careless or improper methods of management. Destructive accelerated erosion so common in cultivated fields is man-made, and could be much retarded or entirely prevented by use of proper methods. One way to conserve the soil would be to refrain from using it, but a desirable conservation practice is wise use rather than nonuse.

Nature not only conserves but builds the soil under a vegetative cover which binds the loose earth with a network of roots, provides a mulch of litter, or covers the surface with a living thatch that sheds water like a roof and saves the soil beneath. This should be a hint as to the methods the farmer should use for saving the soil.

When land is put under cultivation, man's methods frequently run counter to those of nature. He removes the cover of forest or grass, sometimes leaving the soil entirely bare during seasons of heavy rainfall. There is then no tangle of roots to bind the soil, no mulch to protect the surface against the impact of a heavy downpour, and no thatch of living vegetation to shed the surplus water which the soil becomes unable to absorb.

Exposure of the humus-depleted bare surface to heavy rains may so completely seal the top layer with fine clay that the water nearly ceases to enter. The large runoff that follows is practically sure to carry much good soil with it. This is erosion that is seriously accelerated due to a poor method of management. Impermeable tillage pans that develop just below the depth of cultivation may cause nearly as much trouble in heavy soils.

The grower who runs his rows up and down slopes is inviting erosion. Small furrows made by tillage down the slope provide a ready-made waterway which may soon enlarge into a gully of disastrous proportions.

Rows should run across the slope with the contour, so that water does not so easily find a passage down the slope to carry away the soil. Even a wheel track down a slope may become a gulley. This means that when possible such up and down traffic should be avoided.

Tillage which pulverizes and smooths the surface of a field is conducive to erosion. A surface of clods rather than dust will retard erosion. If the soil does not form clods, tillage which leaves small ridges across the slope will help prevent loss of soil. Tillage which helps water penetrate into the soil or which slows up runoff from the surface retards erosion.

Next to a sod cover, the winter cover crop is the best protection

against erosion. The cover crop should be seeded across slopes, and a liberal rate of seeding should be used to make a thick growth for soil protection.

Early seeding naturally affords more protection than late seeding. The protection increases as the amount of growth on the surface and the profusion of root system increases.

Addition of any kind of organic matter to the soil reduces the erosion hazard. Organic matter such as straw spread on the surface reduces erosion. Steep slopes if not kept in permanent sod should be covered with straw or spoiled hay.

Much serious erosion can be observed at times in strawberry fields between rows or in the orchard between tree rows. A few small gullies that may look harmless enough may enlarge into chasms that completely ruin the field. Even a few millimeters of top soil taken off as muddy water may cause greater loss of fertility than is removed in the entire crop.

Any of the rich top soil lost is too much because it can never be replaced and nature requires 500 to 1,000 years to make one inch of good soil by her slow methods. It is much better economy to save the good soil than to attempt to rebuild what is left after the good top soil is gone.

Not all soils erode with equal ease. Both sand and silt erode easily for lack of binding material, when flood waters sweep over the surface of a field.

Most of the serious erosion occurs during the one or more unusually heavy downpours that may come during a season. A soil porous enough to absorb one inch of water in an hour will seldom erode because not often is there that much precipitation. Once in a great while a cloudburst may loose more water than any soil can absorb. It is during these unusual rains that the soil is in greatest need of protection.

A deep freeze may result in surface erosion if a heavy rain should come while the top soil is melted and mellow and the soil underneath is still frozen. The muddy water going down swollen streams during the winter and spring is ample evidence that considerable erosion occurs somewhere at times. Eroded soil means lost dollars in income because eroded fields cannot produce as much as before the soil was lost.

Good soil conservation implies not alone saving the soil but rather saving all those properties that determine the capacity of the soil to produce crops. Saving the soluble nutrients is essential to conservation. A vigorous plant cover maintained as nearly continously as possible is the best precaution against leaching losses.

Preservation of the mellow sponge structure is likewise essential to good conservation. Reduced

tillage and increased humus renewal are most important for this purpose. Chemical treatments are of little help in preserving or improving structure except as they help to grow more soil improving plants with bigger and deeper root system and greater humus renewal value.

The fruit grower is especially concerned with these problems because he is usually compelled to practice summer tillage for weed control. The more he cultivates, the more difficult it becomes to preserve a granular porous soil rich in humus and of high productivity. When gullies start he finds them difficult to control and probably more soil is lost than he at once realizes. Serious erosion is like smallpox that leaves its scars even when the trouble appears to be cured.

Perhaps the greatest problem of all is to come to a realization of the importance of conservation. With no more new and unexploited lands farther west it behooves every grower to save what he has to the best of his ability. With the adoption of the best known methods, the productive value of our present good lands can be preserved.

How to Figure 56-Day Litter Weights of Pigs

Swine Herd Improvement Associations like to have their members weigh their pigs the day the litters are eight weeks old. When you have several litters this runs into quite a chore. And as every farmer knows, the bulk of the work has a way of coming right smack in the middle of a busy week.

With this in mind, the University of Illinois College of Agriculture has worked out a formula you can use to adjust litter weights taken a few days before or after the 56th day. It works like this: multiply the litter weight by 41. Then divide this by the age in days minus 15.

Here's an example: suppose you weigh, on the 50th day, a litter that comes to 320 pounds. Multiply 320 by 41 to get 13,120. Divide that by the age of the litter (50 days) minus 15 (or 35) and you get a 56-day weight of 374.8 pounds. That's what the litter would weigh on the 56th day.

When you compare gilt litters with sow litters, add 40 pounds to the weight of the gilt litters to put them on par with older sows. Experience shows that sow litters usually weigh about that much more at eight weeks.

—Farm Journal

Light Control Breeding

Condensed from Sheep Breeder

Dr. Louis Herrman

OVER the last few years evidence has been accumulating among biologists of a very curious and interesting effect on animal life of light, or, to be more precise, of the gradual changes throughout the year of the duration of daylight—a discovery which may be found to have some important practical bearing on the breeding of farm animals.

Experiments in England with ferrets carried out in 1932 by Bissonnette showed that, though these animals naturally breed in spring and summer, they could be brought into breeding condition in winter by being subjected, under certain conditions, to artificial light.

The light stimulus to the eye is carried along the nerve path to a particular region of the brain whence the impulse is passed on to a gland at the base of the brain, the anterior pituitary, which thereupon secretes a chemical substance, a hormone, that finds its way through the bloodstream to the reproductive glands.

The knowledge of these facts formed the basis of a series of experiments recently carried out with a view to discovering what determined the breeding season of sheep, and whether it was possible to reverse the season experimentally.

In the British Isles, as every English poet knows, lambkins frisk in the springtime and in the early summer. Lambing, in fact, is not ordinarily possible during the autumn or at all during the months from September to December inclusive; for the mating season extends only over the autumn and early winter months.

This is not the case in South Africa. The Merino sheep, for instance, is capable of breeding all the year round, with some modification depending on the state of the veld; though it is customary and convenient to mate the ewes in October when the spring rains produce a plentiful supply of good veld and when, owing to the abundance of vitamin E present in green foods, fertility is at its highest.

But nutrition, it appears, does not determine, as was formerly supposed, the breeding cycle of the sheep. A research biologist, N. T. M. Yeates, working at the School of Agriculture in Cam-

Reprinted by permission from Sheep Breeder,
Chicago, Illinois

bridge, by practising an ingenious deception on his ewes, has persuaded them to lamb in autumn.

It had been observed that British breeds of sheep transferred to the southern hemisphere reverse their time of breeding to conform with the new seasons. What is the stimulus that produces the change? The earlier experiments with light provided a clue to the answer.

Yeates subjected his Suffolk ewes to artificial light in such a manner as to reverse the seasons in respect of the duration of daylight. He gave them carefully measured increasing doses of electric light during the shortening autumn days, and shortened the long summer days by enclosing the sheep at appropriate times each day in a black-out pen to imitate, in summer, the shortening days of early winter and the lengthening days of late winter.

He turned the seasons in effect topsy-turvy, with the result that the lambs were bred in early summer and born in autumn. Here was no simple effect of light stimulating; the breeding state, it appears, continued as long as the days continued to decline in length, but at a certain time, which he ascertained, after the artificially contrived shortest day the breeding state of the ewes was displaced by the resting state or anoestrum.

Moreover, by advancing by two months the time of the change from shorter to longer days, he also advanced by two months the resting stage of the ewes. He thus established the fact that with Suffolk sheep, at least, the breeding season begins approximately three months after the longest day. The change in light trend appears to be the stimulus that sets the clock for the breeding cycle of, at least, some varieties of sheep.

A Way to Get Ewes to Adopt Orphan Lambs

Here's a trick that will usually get ewes to claim orphan lambs, says Robert Dozier, sheepman from Solano County, Calif. Just rub some kerosene on the tail and rump of the lamb, and some on the ewe's nose.

Ewes go by smell, and the kerosene confuses them long enough so that they gradually get used to a strange lamb.

—Farm Journal

Hunger Signs in Crops

Condensed from Better Farming Methods

L. E. Childers
U. S. Dept. of Agriculture

FARM CROPS, no less than farm animals, sometimes get hungry. Unlike a bunch of growing shoats that squeal and fight at the trough until feed is provided, or cows that bawl at the barnyard gate for their regular allowance of hay or silage, plants in the fields don't make any noise about their hunger.

The signs of hunger in crops can be just as plain to an observing farmer, however, as the squealing of his pigs or the bawling of his cattle.

Livestock that never get enough to eat or lack some essential part of their diet, gain very slowly and become stunted. It is often observed that animals once stunted by lack of feed during early growth seldom win ribbons in the prize ring, and usually never quite measure up physically or in productive ability to their well-nourished brothers and sisters. Once a runt, always a runt—this is the rule, although as in all generalities, there are exceptions.

Plants that aren't well nourished also grow slowly and may become stunted. Slow growth is a common sign of plant hunger, although it may result from any disturbance in the plant-soil-water-light balance, such as drought. Slow growth also may be caused by disease or insect attacks.

It has been shown by research that where plants become stunted through improper nutrition or show other signs of soil deficiencies in minerals needed for normal growth, the chance for a big crop may already be lost even with other favorable conditions. Even if the needed nutritive element is supplied, where hunger signs are already present in the growing crop, the deficiency cannot be completely remedied in time for a maximum yield, although the hunger signs may disappear and the crop may make a much larger yield than it would make if such steps were not taken.

Hunger signs in animals and plants have not always been recognized as such, although the physical symptoms are sometimes very definite. It has been only in recent years, for example, that certain abnormal symptoms in cattle have been recognized as resulting from a lack of cobalt in the soil and in crops grown on these de-

Reprinted by permission from Better Farming Methods,
Mt. Morris, Illinois, March 1950

ficient soils. In crops, many of the hunger signs are even now not well defined, although some of them are becoming well known even to farmers. Intensive research is being done at many experiment stations to increase present knowledge.

A few years ago the yellowing or firing of the leaves in a cornfield generally was accepted as caused by lack of moisture. Now farmers know that this is often not the case. It may be a sign of nitrogen hunger. It may occur even when there has been ample, rainfall, although drought may intensify the symptoms. It appears in young corn in stunted and spindling plants, with leaves becoming greenish yellow to orange in color and tip ends gradually dying. In older fields the symptoms may be similar, with older leaves at the bottom of the stalks first turning brown and with firing starting from the leaf tips and following down the center or midrib of the leaves.

Severe shortage of phosphorus causes corn to take on a characteristic purplish tint during early growth, which may follow through the entire life of the plant, even to the grain. A retarded growth rate and slow maturity also are major symptoms. Effects of this are noticable later in irregular rows of kernels on the ears and other imperfections caused by poor pollination. Some symptoms common in nitrogen deficiency also may be seen.

Lack of potash shows up first in slowing of the growth rate in seedlings or young plants, many of which are spindly, with leaves turning yellowish green to yellow and showing marginal scorch. Usually the yellowing is streaked, this being more marked in older plants. Brown-edge scorching of the leaves is the most outstanding sign, contrasting with midrib browning as in nitrogen deficiency. Browning usually progresses from the bottom of the plant up. Usually the plants are weak and lodge easily.

Signs of magnesium deficiency also are distinctive, appearing in broadleafed crops such as cotton as bronzing, or other discoloration of the outer leaf parts, but with midrib remaining green. The leaves of corn tend to show streaky blotches. Oldest leaves show the signs first, with yellowish coloring appearing between the parallel veins. The streaks extend the entire length of the leaves.

Boron also is deficient in many soils, and shows up especially in alfalfa, although symptoms have been observed on a number of the legumes. It appears in alfalfa as yellowing of the leaves near the growing point, sometimes with reddening, and with lower leaves remaining green. The plants become stunted by shortening of the internodes, resulting in reset-

ting, with flowers failing to form and buds appearing white or light brown and dead.

The symptoms often appear most abundantly after drought. The relatively high applications of lime used on alfalfa also often intensify the symptoms because the nutritional balance is upset. Alfalfa fertilizers used in the eastern states now frequently contain enough borax to supply the 13 to 20 pounds per acre with normal fertilization rates needed to correct boron deficiency.

Other nutritional deficiencies have similar indicators. In corn, for example, lack of calcium causes gelatinizing of the young unfolding leaves with tip ends sticking together. Lack of zinc shows as "white bud" or chlorosis of the youngest leaves.

Deficiency symptoms tend to take a general pattern but may vary from crop to crop. Different symptoms of the various deficiencies may appear in different plants, or in different organs of the plants. Foliage symptoms may show in color, density, size and shape of the leaves. The thickness, color and length of the internodes of stems or stalks may be affected.

Roots may show differences from normal in color, amount of fiber, size or thickening. The amount of bloom and time of opening may be affected. Fruit characters, such as size, color, hardness and flavor may vary from the normal.

Corn and cotton are good indicator plants used in many rotations. Where steps are taken to correct deficiencies that show up in these crops by applying the needed nutrient, either separately or in combination with other fertilizers, they will tend to fortify the other crops in the rotation against deficiencies that may show up in different ways.

Farmers who keep up with research and make careful observations in different fields are in the best position to observe and study symptoms as they appear. In some cases, tissue analyses may be desirable to determine whether or not the soil is furnishing adequate nutrients for the plants.

The Business of Cattle Feeding

Condensed from The American Hereford Journal

Paul Thompson

WHY do we feed cattle? Well, why do ranchers and others grow cattle? Why do packers operate packing plants? Why do retail outfits sell beef?

There may be many and various reasons, but I presume the fundamental reason is to make money. Ask any rancher who has sold cattle to me, or any packer who has bought cattle from me, if the profit incentive influences my operation. In all probability, they will tell you that it is their impression that it does.

There are two general classes of cattle feeders—the speculative feeder and the conservative feeder.

The speculative feeder buys all the feed he uses, both concentrates and roughage. As a rule he feeds choice cattle, frequently choice, heavy cattle and for a short feed. Usually he feeds cattle in large numbers. The margin between cost and selling price is the big factor in this type of operation. When good margins can be had this type of feeding is the most profitable of all. The speculative feeder should be in position to take a loss, and sometimes a big loss. Some of the boys found this to be the case during the fall and winter of 1948–1949 when losses were staggering—as much as $200 a steer.

The conservative feeder usually feeds from one to 10 carloads of cattle as a part of a general farm program. He has several reasons for feeding cattle.

1. To consume roughage grown on the farm, much of which is unsalable. Usually about 1½ tons of roughage is produced, on the average cornbelt farm for each ton of grain.

2. To help market the grain grown on the farm.

3. As a good farm practice in relation to maintaining a high fertility level. Farms where cattle are fed are usually the most productive in the neighborhood.

4. Many farmers enjoy having cattle on their farms and would feed them for this reason alone.

Present-day consumer demands are for small cuts. To produce small cuts of beef, grading high commercial or better, requires the carcass of a young animal that has been fattened on grain, exception for a milk-fat calf. Some cattle markets have little or no demand for animals weighing over 1,050 pounds unless they grade

Reprinted by permission from The American Hereford Journal,
Kansas City, Missouri, March 15, 1950

choice or prime, and even then the demand is limited.

To produce a lightweight steer suitable for slaughter requires feeding. Few grazing areas in the United States will fatten a yearling or two-year-old steer. This demand for light carcasses, I believe, will be with us for a long, long time. It is a matter of great concern to a certain type of operator, namely the operator that grazes aged steers and sells them as grass-fat cattle.

One very good operator, who for years has run cattle by the thousands in the Bluestem country of Kansas, selling most of them as killing cattle direct off the grass, last summer spent much time studying the grasses of several areas in various parts of the country, hoping to find a spot where a yearling heifer or a two-year-old steer would fatten satisfactorily on grass alone. Many areas will fatten a three- or four-year old, but the markets are not too receptive to them. No one knows how cheaply these cattle would have sold last fall had it not been for the broad feed-lot demand, particularly for the better end, which took the pressure off as it left fewer to be sold for immediate slaughter.

I bought a thousand of these cattle during three market days at St. Louis at a price slightly above 17 cents and thought I stole them, as the man who sold them knew I did. I marketed these cattle late last year and they were stolen again. It is quite singular that one drove of cattle within a period of four months has been stolen twice. What was the trouble? It is as simple as this—Mrs. Housewife did not like the cuts from their carcasses. Mrs. Housewife in Indianapolis turned them down as did Mrs. Housewife of Cleveland, O.; Detroit, Mich.; Pittsburgh, Pa.; Lancaster, Pa.; Chicago, Ill.; and Buffalo, N. Y. I know because some of these cattle were on each of the markets named. The selling agenices practically without exception asked for lighter cattle.

The cattle and beef industry is a four-segment industry. It consists of the rancher or cattle grower who produces the calves and stocker and feeder cattle; the cattle feeder who fattens the cattle; the packer who processes the carcass, and the retailer who sells the meat. In cattle feeding, what part is played and what is its effect on the other segments of the industry?

Take the rancher—how prosperous would he remain if the cattle feeders of the country sealed their corn and took a complete and prolonged vacation from cattle feeding. The packer would certainly have a crowded condition on his killing floor during the fall runs of grass cattle, with coolers filled with commercial and lower grades of beef only, which

would badly oversupply the market. Then, during winter, spring and early summer, the plant could operate with part-time skeleton crews, and what beef carcasses were processed would grade utility and down.

It is evident that the cattle and beef industry cannot function as it needs to function in this country without the cattle feeder. He does so much to distribute the product throughout the year and he so improves the product—makes it so much better to eat—that his role is highly essential. The cattle feeder definitely recognizes that he, too, cannot function without cattle to go in his feedlots. Thus, the rancher is indispensable to him. Neither can he function without an agency to process his fat cattle. The packer is indispensable to him. Neither can he function unless the product reaches the consumer, who incidentally pays the bill. Thus, the retailer is indispensable to him. In order to maintain satisfied customers and a strong industry all segments of the industry must recognize the rights and problems of each other and co-operate for the good of all.

Unhappy, cattle feeders, under certain conditions, have been known to have expressed the idea that ranchers are hold-up men and packers are thieves. Let's examine the backyard of a cattle feeder. He buys feeder cattle as cheaply as he can and sells his fat cattle as high as possible. He is doing exactly what the rancher did—selling as high as possible, and exactly what the packer did—buying as cheaply as possible. That is neither hijacking nor stealing. The rancher is not a hold-up man, the packer is not a thief, and the cattle feeder is all right. All are simply human.

A cattle feeder, to be fitted for the job, should have certain specific knowledge.

1. Knowledge of the types, grades and values, of both fat and replacement cattle.

2. Knowledge of the markets for both replacement and fat cattle—when and where to buy and when and where to sell.

3. Knowledge relative to the housing and handling of cattle, cattle diseases and their treatment.

4. Knowledge of nutrition, which embraces vitamins, minerals, proteins, fats, carbohydrates and the over-all balancing of a ration as to ingredients and bulk.

5. He should keep posted on present general economic conditions and the outlook for the future. Certainly the price of cattle is directly and quickly affected by fluctuations of commodity markets and even by those of the stock markets.

6. A cattle feeder usually needs a good banker.

7. A few oil wells would be convenient at times.

8. Even a rabbit's foot might help.

During recent years considerable advancement has been made in methods of feeding cattle. Labor-saving equipment in some feeding plants has replaced the scoop shovel. By-products such as corn cobs have been introduced into cattle rations at a profit. Improved pastures, aided by fly control, are giving results undreamed of a short decade ago—results not only as to the gain made by the cattle but also as to the finish of the cattle.

Fly control is the greatest aid to me, in my operation, of any development that has come along since I have been in the cattle business. For one thing, it eliminates that "stand still" period during hot weather and fly time, when the cattle make little or no gain. Based on my experience in feeding thousands of cattle in drylot throughout the four seasons of the year, I am of the opinion that hot weather does not adversely affect the gains made by cattle. Furthermore, based on my experience in grazing cattle from Mississippi to Wisconsin and from Indiana to Kansas, it is my conviction that beef cattle being fattened on grass do not need shade; in fact shade is a detriment. The cattle loaf too much in the shade.

Grass at best is a bulky feed. Cattle make larger gains and fatten more rapidly when they take good fills of it. Extra grazing each day results in better fills and larger gains. In making this comment I realize that it is not in accordance with general opinion. In some areas, where it isn't practical to round up the cattle at regular intervals for spraying, it would not hold true. In other areas of extremely high temperatures it might not hold true.

It is my opinion that the successful cattle feeder 20 years from now will depend upon a combination of grass and grain, regardless of how valuable his farm land is or how much corn it will grow. He will plan his feeding program so that the drylot phase of the operation will be a supplement only. Competition will bring this about. Don't think of pastures as we are accustomed to them generally. Think of a pasture as being a combination of one or more good grasses and one or more good legumes growing on a piece of land that has been developed to do the job. I am speaking of midwest pastures, which I should at least know something about. What does it take to develop a good midwest pasture?

If the soil is acid—limestone must be applied to sweeten it.

The organic content of the soil must be high. In other words, it must contain lots of humus. Soil with a high humus content absorbs water like a blotter, preventing rainfall run-off, and retains it for

future plant use. It is favorable for the growth of soil bacteria which are essential in growing legumes. This must be accompanied by a high fertility level. The soil must contain an abundance of plant food. Phosphate may be needed. If so, it must be applied, and in sufficient quantities. Potash may be needed. If so, it also must be applied. Nitrogen can best and most economically be supplied to the soil by including one or more legumes in the pasture plants grown. In addition to using atmospheric nitrogen, and fixing it in the soil, legumes also add to the protein content of the forage produced. Even grasses grown in combination with legumes are higher in protein content than when grown alone, and they grow ranker and greener.

After a good pasture is established, weeds must be controlled by clipping, and the pasture must not be overgrazed. Such a pasture furnishes a more concentrated cattle feed of higher nutritional value than the usual run of "so-called" good pastures.

Tenderized Beef on the Hoof

A new formula injected into the circulatory system of a steer shortly before it is slaughtered tenderizes the meat, even though the animal has not been fattened on corn or grain before being marketed. The process originated by Dr. Oscar Schotte, professor of biology at Amherst College, has been tested in Texas slaughter houses for two years on range cattle. Ordinarily, such cattle are too lean and tough for good table beef and are brought to feeder lots when almost full grown for fattening. With the new injection, a tough, old range steer can be converted into choice cuts of meat just as the sleekest yard-fed stock. A definite advantage of the formula is that it works directly on the edible tissues of the beef, whereas corn-fattening puts excessive amounts of fat around but not directly in the tissues.

—*Hospital Topics*

Three Hogs Went To Market

Condensed from Marketing Activities

H. E. Reed

THREE hogs of the same weight were sent to market but that's where the resemblance ended. One hog produced nearly 5 percent more of the preferable lean cuts by weight than the second, and nearly 10 percent more than the third. Yet, because their weight was the same, so was the price paid for them.

This leads us to the most serious marketing problem confronting the hog industry today. And the problem boils down to this: Too much importance is being given to weight in determining hog prices. For weight is not the only factor determining hog value. If other factors are overlooked, as is done when hogs are being sold on a weight basis, we have an inequitable method of pricing.

From the producer's standpoint, a change is long past due. Certainly it is true that the fatter and heavier the hog, the higher the carcass yield. But with changes that have taken place in the demand for pork products, a measure other than carcass yield should be used to determine the true worth of hogs.

In recent years we have seen rather startling changes in the relative values of pork cuts. The leaner pork cuts have captured consumers' fancy while the fatter cuts have gone begging. At the same time lard, faced with strong competition from vegetable oils, has fared rather badly price-wise. All this adds up to the fact that cut-out yields are more important than carcass yield or weight in determining the value of live hogs.

We in the Livestock Branch of the Production and Marketing Administration, as well as many people in the industry, have realized for some time that the practice of letting scales determine the price of hogs is a bad one. Pricing hogs according to weight is a fast method of handling hogs in the market place, of course, but since hog shippers are paying their agents to obtain the highest possible net return, speed should not be the criteria for establishing a marketing practice. This is particularly true when the weight method does not provide hog producers with an incentive to produce the type of hogs the market can best absorb.

But we in the Livestock Branch

Reprinted by permission from Marketing Activities,
Washington, D. C., February 1950

also were aware that *talking* about improved marketing methods does not necessarily bring about improvement. Before there can be real improvement, there must be some usable standards that both buyers and sellers can employ to identify real quality in hogs. Such standards have been developed.

After much painstaking research, our specialists are ready to take the wraps off standards for grading live hogs. These should go a long way toward solving this knotty problem of merit selling of hogs. We are not advocating through these standards compulsory Government grading or anything of the sort. The standards are tools that have been developed as a means of appraising the value of a live hog in relation to its eventual cut-out value.

It seems to me that the proposed system of standards is essential for at least three reasons: First, something of this sort is absolutely necessary in the proper sorting and merit selling of hogs. Second, it is as good a solution as I can visualize for curtailing our growing lard problem. And third, it is an answer to the urge for carcass grade and weight selling which seems to come from those who are dissatisfied with present marketing practices. These new live hog standards will permit translation of cut-out values to live hog prices.

Both producer and packer are interested in hogs that produce the largest proportion of the more valuable pork cuts—both from their own economic standpoint and to satisfy consumer preferences. For many years the industry has been aware of the importance of cut-out value of hogs but has lacked a guide by which that value could be quickly and easily appraised in a live hog. With a great deal of assistance from State Experiment Stations, Extension Services, State Colleges and Universities, other Department agencies and the industry as a whole, our standardization specialists, have developed a system we think will do the job.

Some knowledge of how the grades were developed is needed as a key to better understanding and more successful application of the standards. The first step in developing the grades was to work out standards applying to carcasses and then translate these results into live hog grades.

The carcass grade system is based on the ratio of lean cuts to fat cuts as indicated by certain apparent characteristics of the carcass. This system has proved to be extremely accurate and satisfactory in determining the value of hog carcasses.

In the early development of these standards two factors seemed to be of primary importance: The yield of lean cuts from a carcass and the quality of the meat in the cuts. Consequently, standards that

would adequately measure these two factors became our goal.

A great many carcass measurements were given a thorough going-over by our specialists. They came to the conclusion that the yield of hams, loins, picnics and Boston butts were representative of the ratio of lean to fat within the carcass. Once they settled on these four as the primary cuts they sought a yardstick that would indicate the yield of these lean cuts and at the same time not overlook the quality of the cuts.

Shoulder and ham thickness, carcass length and depth, back fat thickness, and other factors were studied to find a clue as to this vital relationship. It soon became apparent to the researchers that back fat thickness was the best single factor for estimating the proportion of lean to fat within the carcass. Further tests showed that the back fat thickness in relation to the length or weight of the carcass permitted a more accurate estimate of the ratio of lean to fat cuts.

Using these factors, the next step was to develop ranges or limits of thickness that would adequately define the different categories or grades of carcasses. Five grades of pork carcasses are defined in terms of the range in average back fat thickness at different carcass weights. Following is the Schedule of Proposed Carcass Measurements for Grades of Slaughter Barrows and Gilts.

Three divisions of pork quality —Choice, Medium and Cull—are recognized in the five grades. Choice No. 1, Choice No. 2, and Choice No. 3 are comparable in that all produce choice quality cuts, but the grades differ in fatness and in yield of lean cuts. Medium and Cull grades differ in quality of cuts as well as in yield of lean cuts.

Each grade of slaughter barrows and gilts is based on and corresponds to one of the pork carcass grades. The standards describe the characteristics of live hogs that are appraised to determine grade on the basis of lean to fat of the carcass and the quality of the cuts.

Such characteristics as width in proportion to size, shape over the top of the back, width near the top line compared with width near the underline, comparative width through the shoulders and hams are indications of the ratio of lean to fat of the animal. In general, all of these characteristics change gradually in proportion to each other and to differences in degrees of finish, but numerous combinations of the characteristics are found in animals of the same grade.

Following are specifications for live hog grades that are being made available now. These are not officially promulgated standards but are proposed standards

SCHEDULE OF PROPOSED CARCASS MEASUREMENTS FOR GRADES OF SLAUGHTER BARROWS AND GILTS

Weight (lbs.)		Average Back Fat Thickness[1] of Carcass, by Grade				
Live (Approx.)	Carcass	Choice No. 1	Choice No. 2	Choice No. 3	Medium	Cull
		Inches	Inches	Inches	Inches	Inches
140	92					
		1.46–1.73	1.74–0.02	2.03 or more	1.03–1.45	1.02 or less
170	115					
		1.51–1.78	1.79–2.07	2.08 or more	1.08–1.50	1.07 or less
200	138					
		1.57–1.84	1.85–2.13	2.14 or more	1.13–1.56	1.12 or less
230	162					
		1.62–1.89	1.90–2.18	2.19 or more	1.18–1.61	1.17 or less
260	187					
		1.68–1.95	1.96–2.24	2.25 or more	1.24–1.67	1.23 or less
290	213					
		1.74–2.01	2.02–2.30	2.31 or more	1.30–1.73	1.29 or less
320	240					

[1] Average of three measurements made opposite first and last ribs and last lumbar vertebra.

that will be promulgated as soon as the use of them corrects any possible shortcomings.

Choice No. 1 grade slaughter barrows and gilts have an intermediate degree of finish, as indicated by body proportions and other evidences of fatness. The degree of finish of this grade is near the minimum necessary to insure the production of Choice quality cuts. Hogs of this grade appear moderately wide over the top in proportion to the weight of the animal. Width of body over the top is nearly equal to that at the underline. The back, from side to side, appears well rounded and is slightly full at the edges with a smooth blend into the sides. Width is usually nearly equal through the hams and through the shoulders. The sides are usually moderately long in relation to weight, moderately thick, and usually smooth with moderately thick, full flanks. Depth of rear flank is slightly less than depth of fore flank. Hams are moderately thick and full, indicating a moderate covering of fat. Jowls are usually moderately full and thick. All parts of the body present the slightly full, convex appearance associated with a moderate degree of finish. Barrows and gilts in this grade are expected to produce Choice No. 1 grade carcasses.

Choice No. 2 grade slaughter barrows and gilts have a high degree of finish, as indicated by body proportions and other evidences of fatness. The degree of finish of this grade exceeds the minimum necessary to insure the production of Choice quality cuts. Hogs of this grade appear wide over the top in proportion to the weight of

the animal. Width of body is slightly greater over the top than that at the underline. The back, from side to side, appears slightly flat and is full at the edges with a noticeable break into the sides. Width is usually slightly less through the hams than through the shoulders. The sides are usually slightly short in relation to weight, thick and smooth, and the flanks are thick and full. Depth of rear flank is nearly equal to depth of fore flank. Hams are thick and full, indicating a thick covering of fat, especially over the lower part. The jowls are usually full and thick, and the neck appears short. All parts of the body present the full, convex appearance associated with a high degree of finish. Barrows and gilts in this grade are expected to produce Choice No. 2 grade carcasses.

Choice No. 3 grade slaughter barrows and gilts have a very high degree of finish, as indicated by body proportions and other evidences of fatness. The degree of finish of this grade considerably exceeds the minimum necessary to insure the production of Choice quality cuts. Hogs of this grade appear very wide over the top in proportion to the weight of the animal. Width of body is considerably greater over the top than that at the underline. The back, from side to side, appears rather flat and is very full at the edges with a definite break into the sides. Width is somewhat less through the hams than through the shoulders. The sides are usually short in relation to weight, very thick and smooth, and the flanks are very thick and full. Depth of rear flank is equal to depth of fore flank. Hams are very thick and full, indicating a very thick covering of fat, especially over the lower part. The jowls are usually very thick and full, and the neck appears very short. All parts of the body present the very full, convex appearance associated with a very high degree of finish. Barrows and gilts in this grade are expected to produce Choice No. 3 grade carcasses.

Medium barrows and gilts have a slightly low degree of finish, as indicated by body proportions and other evidences of fatness. The degree of finish of this grade is slightly less than the minimum necessary to insure the production of Choice quality cuts. Hogs of this grade appear slightly narrow over the top in proportion to the weight of the animal. Width of body is slightly less over the top than that at the underline. The back, from side to side, appears slightly peaked at the center, especially over the shoulders and immediately behind the shoulders, and lacks fullness along the edges with no readily apparent break into the sides. Width is usually slightly greater through the hams than through the shoulders. The

sides are usually long in relation to weight, slightly thin and wrinkled, and the flanks are thin. Depth of rear flank is somewhat less than depth of fore flank. The hams are slightly thin and flat with a slight tapering in the lower parts. Jowls are usually slightly thin and flat, and the neck appears rather long. All parts of the body present the slightly concave appearance associated with a slightly low degree of finish. Barrows and gilts in this grade are expected to produce Medium grade carcasses.

Cull grade slaughter barrows and gilts have a very low degree of finish, as indicated by body proportions and other evidences of fatness. The degree of finish of this grade is considerably less than the minimum necessary to insure the production of Choice quality cuts, and most cuts are suitable only for processing. Hogs of this grade appear narrow over the top in proportion to the weight of the animal. Width of body is somewhat less over the top than that at the underline. The back, from side to side, appears peaked at the center and slopes into the sides with no apparent break. Hips are often rather prominent. Width is usually somewhat greater through the hams than through the shoulders. The sides are usually very long in relation to weight, very thin and wrinkled, and the flanks are very thin. Depth of rear flank is considerably less than depth of fore flank. The hams are very thin and flat with a decided tapering in the lower parts. Jowls are usually very thin and flat, and the neck appears very long. All parts of the body present the concave appearance associated with a very low degree of finish. Barrows and gilts in this grade are expected to produce Cull grade carcasses.

There is good evidence to indicate that experienced hog men can familiarize themselves and make use of these live hog standards in a short time. In fact, actual demonstrations have proved this to be true. Further, both producers and hog buyers have often been amazed at the live hogs that are placed in the Choice No. 1 grade —they are accustomed to placing emphasis on a much fatter hog. However, when they have seen the carcasses there was invariably agreement that the grading system identifies the hogs producing the most valuable carcass. Generally the demonstrations which we have been able to give thus far have met with considerable enthusiasm from both producers and packers.

Lest hog producers feel that this system will cause drastic changes in breeding programs, let me assure you that *any of our present breeds of hogs, if properly selected, fed, and marketed, will produce a Choice No. 1 carcass.* Undoubtedly some breeds will utilize feed more efficiently than others and

will lend themselves to the attainment of heavier weights without becoming excessively fat, but under this system of grading it is possible for most any weight gilt or barrow to qualify for Choice No. 1 *if* selection, feeds and management practices are properly controlled. This grading system, if used, will provide the basis for giving recognition to the producer who has consigned an outstanding lot of hogs. In most cases, he has been getting little if any recognition in the prices he receives. Under present selling methods, if his hogs having a high cut-out value fall within a certain weight bracket, he receives approximately the same price as the shipper who consigns overfat and poorer cutting hogs of the same weight bracket. The best load of hogs cuts out much more money for the processor and carries the fat load for the packer to average out cost.

This should not be interpreted as suggesting that the use of these standards will make packers pay more total money for hogs than competition forces. Use of these standards should prompt a better job of distributing the total amount of money among producers on the basis of the quality and value of hogs. Instead of selling all hogs within a given weight range at the same price, selling individual lots of hogs on their merits is essential if quality production is to be rewarded with premium prices.

Choice No. 1 carcasses produce about 48 to 51 percent of their weight in the four primary lean cuts of hams, loins, picnics and butts. A Choice No. 2 carcass produces only 45 to 48 percent of its weight in lean cuts and a Choice No. 3 will cut out less than 45 percent in the four lean cuts.

You Can Judge a Fleece By a Sample of Side Wool

You can judge the fleece of any sheep by looking at the side wool. It's not a bad idea to pick your breeding stock that way; it also works for figuring out how much clean wool there will be in an entire fleece.

Sheepmen have tried it on dozens of sheep at the USDA Station at Dubois, Idaho. They took small samples from the sides of the sheep, and compared the samples with the complete fleece. They say that as little as two ounces of side wool is enough to judge the entire fleece.

—Farm Journal

New Northern Sorghum

Condensed from The Farmer

NORGHUM, the northern variety of grain sorghum developed by Clifford J. Franzke of South Dakota State College, Brookings, will replace corn this spring on many an acre in South Dakota, Southern North Dakota and Western Minnesota. The replacement will come not alone because of forced corn acreage reduction, but because Norghum under adverse conditions has proved itself a high yielder of a grain which is practically equal to corn in feed value. Cattle, hogs and lambs (especially lambs) relish and do well on Norghum.

In Norghum there are all the virtues of older varieties of grain sorghums plus many of its own, and its faults are minor. It grows to a height of 36 to 46 inches, matures well ahead of frost, is easily combined, and last summer in parts of South Dakota where corn made yields of only 15 to 20 bushels per acre it yielded up to 50 bushels.

One grower summed up his praise for Norghum this way: "There's not much you can say against sorghum now that we have Norghum."

Norghum, like other sorghums, has the characteristic of suckering out after having been beaten down by hail, chewed down by insects, or damaged by drought.

Unlike older varieties of grain sorghums, Norghum can be depended upon to mature, dry out and be in condition for the bin before frost arrests its growth. Last season at Brookings, S. D. there was a frost on August 28th. There was some delay in getting the Norghum combined because of rain, but finally after four days of rain harvesting got under way and even then there was only 12% moisture in the seed. It was binned and there was no heating or spoilage. Sorghum grain will keep if the moisture content is 13% or less.

Many farmers dislike sorghum because they feel it is hard to plant. Here's what Lyman County growers have to say. Mr. Wagner one-ways his sorghum land early in the spring. After the weeds have sprouted he disks or harrows the field. Shortly before planting time he harrows the field crossways. This thorough working keeps weeds down and moisture near the surface. He plants at the rate of three pounds per acre, using a lister from which he has removed the moldboards. The wings were cut down to a width of four inches. He likes to get the seed about an

Reprinted by permission from The Farmer,
St. Paul, Minnesota, April 1, 1950

inch deep. Sorghum plates are the only special equipment needed.

County Agent Strachan told of a field which Oscar Byre, who farms north of Kennebec, put in during the last week of May. Byre stopped every other hole in his grain drill and drilled the sorghum in rows 20 inches apart. On the morning of Sept. 1, Mr. Strachan took a field run sample. He threshed it the next day and on the morning of Sept. 3 he took it to the elevator for a moisture test and it tested 9.5%.

As for feed value, Norghum has already proved itself in lamb rations. In an experiment under the direction of Robert M. Jordan at the South Dakota Experiment Station in Brookings, Norghum-fed lambs made slightly better gains than those fed corn. Both lots of lambs under test were fed brome hay and soybean meal. In addition one lot got Norghum, the other corn. Total gain per lamb during the feeding period was 24.8 pounds for the Norghum-fed lot and 24.5 pounds for the lot fed corn. For the corn-fed lot, the feed required per 100 pounds of gain was 495 pounds of corn, 49.5 soybean oilmeal, and 358 pounds of hay. The Norghum fed lot ate 513 pounds of Norghum, 51.3 pounds of soybean oilmeal, and 351 pounds of hay per 100 pounds of gain.

Norghum is fed whole to lambs, but it is recommended that it be ground for cattle and hog rations. There have been no controlled experiments in the feeding of Norghum to cattle and hogs, but hog feeding experiments are scheduled.

The first of the Norghum seed to be released went to members of the South Dakota Crop Improvement Association last spring, and yields were generally highly satisfactory. Anyone interested in obtaining seed should write to the South Dakota Crop Improvement Association in care of South Dakota State College, Brookings, S. D. Names of individuals, elevators, and others having pure Norghum seed are available from the Association's office.

Nose-Drop Vaccine!

Condensed from Hatchery & Feed

Dr. O. H. Peterson

A NEW intranasal vaccine which is easily administered by the nose-drop method has recently been licensed by the Bureau of Animal Industry of the U. S. Department of Agriculture. This new vaccine was developed by Dr. S. B. Hitchner, formerly of the Virginia Agricultural Experiment Station, at Blacksburg, Virginia.

The new intranasal or nose-drop vaccine is a live-virus Newcastle-disease vaccine prepared from an extremely mild strain of Newcastle-disease virus. The vaccine may be used with safety on day-old chicks and has been used rather extensively on laying hens in full production without serious loss of egg production.

The new intranasal Newcastle-disease vaccine provides the high degree of immunity that is obtained by the use of live-virus vaccines. Chicks vaccinated at one day of age with the intranasal live-virus vaccine have been shown to possess a high degree of immunity for at least a year after vaccination. Until very recently, only killed Newcastle-disease vaccine could be used on day-old chicks.

The use of the killed-virus vaccine is accompanied by several difficulties, the greatest being that the immunity does not persist for a long period of time. It was originally thought that immunity persisted at least throughout the broiler stage. However, within the past six months, an increasing number of reports of Newcastle outbreaks among broiler operators who have routinely used killed-Newcastle-virus vaccines have been observed.

Although a much more intensive degree of immunity is obtained by the use of the older live-virus vaccines, their use is not without danger. Laying hens which have been vaccinated or have been kept in contact with birds vaccinated with the older type of live-virus vaccine have suffered a serious loss of egg production. When the older live-virus vaccine was first put into general use, it was believed that chicks from such vaccinated parent stock would retain an immunity for a period of at least four weeks. In recent months, the duration of parental immunity has been decreasing and numerous reports are heard in which the immunity in chicks has been completely dissi-

Reprinted by permission from Hatchery & Feed,
Mt. Morris, Illinois, March 1950

pated in from seven to 10 days. Therefore, neither the older killed-virus vaccines nor live-virus vaccines have offered an adequate program of control.

Following the initial announcement of the new intranasal type of vaccine by Dr. Hitchner, the new vaccine was extensively tested in research laboratories and in the field.

Before field tests were instituted, the intranasal vaccine was thoroughly tested in the laboratory and found to be safe and efficacious. The results of field trials with the intranasal vaccine have been spectacular. A concrete example is the case of a broiler operator who had been vaccinating chicks routinely with a killed Newcastle-disease vaccine. In spite of the vaccination procedure, the chicks in the broiler plant came down with Newcastle disease at ages ranging from four to eight weeks. The plant was carrying out a continuous broiler operation and obviously losses would have been excessive if depopulation were carried out. A program of vaccination of day-old chicks with the intranasal vaccine was started without interruption of the broiler operation. The losses of the newly-vaccinated chicks kept on the Newcastle-contaminated premises did not exceed three percent from all causes in any group of chicks started. In several of the groups, losses to market time from all causes were less than one percent.

Other cases of successful field use of the intranasal vaccine may be cited. In a 50 thousand capacity plant in which five thousand chicks were started each week, Newcastle developed at five days of age with a resulting 50 to 70 percent mortality. Vaccination with the intranasal vaccine was started and mortality from all causes following vaccination did not exceed one percent.

Of six thousand chicks vaccinated at day old and kept on infected premises, mortality was three chicks during the first four weeks of life.

The vaccine has been used on Newcastle-susceptible hens in production without loss of egg production due to the Newcastle vaccination. Egg production of a group of 576 old hens from the previous year's hatch shows that prior to vaccination the hens were just coming out of a molt and production figures are rather low for that reason (32 to 41 percent).

On the ninth day, the birds were vaccinated with the Intranasal live-virus Newcastle vaccine. In the 21-day period following the vaccination, there was no serious loss of egg production. It ranged from 41 to 54 and back to 39 percent.

Another study was made of a group of approximately 1,400 pullets which were just beginning production. The birds were vac-

cinated on the ninth day, and no significant effect on egg production was demonstrated during the following 19 days. Production increased from 26 to 47 percent.

The vaccinated birds reported on above, were kept on Newcastle-infected premises. During the time of the experiment, the egg production of two unvaccinated groups dropped to approximately zero.

In one experiment, 105 chicks were vaccinated intranasally when one day old. When the birds were 12 weeks old, each bird was challenged with one hundred thousand embryo minimal lethal doses of Newcastle-disease virus. During the 14 days following challenge, but one vaccinated bird died or showed any symptoms of Newcastle disease—in other terms, a mortality of 0.95 percent was experienced on challenge. Ninety percent of a group of Newcastle-susceptible controls challenged in the same way died of Newcastle disease as a result of the challenge.

The chicks hatched from eggs laid by hens which have been vaccinated with the intranasal vaccine do not have an appreciable degree of parental immunity. Chicks which have a parental immunity can be vaccinated with the intranasal vaccine, and such chicks may be expected to develop Newcastle immunity from the intranasal vaccination.

It is a well-known fact that immunity does not develop immediately upon the administration of a vaccine and that several days are required for the production of a complete immunity. When the intranasal vaccine is used on chicks, it is recommended that the chicks should be placed in thoroughly-disinfected houses and kept isolated as much as possible from infected flocks for a period of at least a week. This gives the chicks enough time to produce immune bodies before exposure to virulent virus.

The immune response in chicks is somewhat better after they are several days old than when first hatched. However, as the incidence of Newcastle disease at present is very high in some areas, a delay in vaccination may prove costly, and immediate vaccination is almost imperative in these cases.

While the intranasal vaccine is the most promising method for the control of Newcastle disease which has yet been proposed, certain limitations are encountered in its use. Much of the effectiveness of the vaccine is lost if the birds are exposed to Newcastle disease before using the vaccine. If laying hens in production are vaccinated after exposure, the vaccination with the intranasal strain does not prevent the loss of egg production which always accompanies a Newcastle-disease outbreak. The intranasal Newcastle-disease vaccine has no cura-

tive properties and does not aid birds which are already infected.

In chicks, the intranasal vaccine should be given before exposure of the chick to Newcastle disease, or in other words, the chicks should be protected from Newcastle infection for several days following vaccination to enable the birds to develop a high degree of immunity.

In a few states, the regulatory officials will not permit the use of Newcastle-disease vaccine except in flocks where Newcastle disease already exists. If a delay of 24 or more hours is encountered before permission can be secured to use a Newcastle vaccine on an infected flock, no beneficial results from any Newcastle vaccination may be expected.

How Much Water Have We?

Condensed from The Christian Science Monitor

Herbert B. Nichols
U. S. Geological Survey

RECENT CURSORY SURVEYS by national, state, and metropolitan water officials have shown that while New York, New England, and certain parts of the West are now faced with water problems, the situation is not such as to warrant fear that the whole nation is in danger of serious shortage.

Water constitutes the major portion of practically all living things and it must be periodically replenished. Some plants and animals living constantly under xerophytic conditions have developed special ways of combating periods of drought. But for most of the plant and animal kingdom, organisms wither and depart through the need for water, long before lack of food becomes primary.

Furthermore, in the civilization that western nations have built, all the energy used to turn the wheels of industry, supply heat to homes, or light our way by night comes either from fossil fuels like coal and oil or from work done by controlled waters—solar energy in the form of raindrops, imprisoned behind mighty dams. From here they will be released to generate hydroelectric power.

Recent surveys also show that since the 1920's the demand for water in the United States has taken a decided spurt, more noticeable in the '30's when water holes turned to powder and dust

Reprinted by permission from The Christian Science Monitor, Boston, Massachusetts, January 28, 1950

filled the bowls of the South and West. Since then the nucleus of specialists in the U. S. Geological measuring, and conserving this Survey charged with locating, precious, though renewable, resource have been trying to tell people everywhere that water can become scarce anywhere.

Increasing industrial production, especially the development of new industries based on chemistry, has enormously increased the demand for water. The manufacture of synthetic fuels, the daily use of modern air-conditioning equipment and stepped-up programs for irrigating farmlands are a few of the activities now calling for unusually large amounts. Statistics also show that with modern plumbing and spinner-type washing machines, automatic dishwashers, etc., the average urban family now uses approximately 200 gallons daily.

Wherever supplies are either insufficient or polluted, civilization's progress is distinctly retarded. Yet there is no reason for alarm in America, according to Secretary of Interior Oscar Chapman, one of whose tasks it is to keep the United States informed on the changing status of natural resources.

"We are not running out of water in the United States, although serious shortages confront certain areas where we don't have water where we want it, when we want it," he says. "Limited supplies economically available in some places may restrict development, or may cause some recesssion of development. But, on the whole, we shall never run out of water in the foreseeable future."

"Our modern way of living and the growth of our economy have created water demands of a kind and size that have exceeded all previous expectations in many places. This is a serious problem that requires vigorous attention. We can no longer take water for granted, as we do the air we breathe."

In addition to its other properties, water is the master solvent. As it passes over and through the earth, it dissolves some of the soluble portions and gradually becomes mineralized. Ordinarily, these minerals are troublesome, but not toxic, to men. However, a few may cause serious health problems. The greater difficulty, however, is in excessive concentrations of minerals such as sodium chloride (common salt) and calcium carbonate, which make the water hard or perhaps unsatisfactory for chemical or agricultural processes.

In order to put dynamic water to work for mankind, it is necessary for engineers to have all available hydroelectric, chemical, and geological data.

There is evidence at hand to indicate that the decline and fall

of several ancient civilizations may have resulted indirectly from such critical problems as the gradual accumulation of salt in the soil and in the ground waters. Research shows that this came from poor land drainage due to a gradual rise of the water table, in turn due to siltation of a river bed, or perhaps to excessive irrigation with salt-laden river water.

Arnold Toynbee has suggested that the 20 or so civilizations which preceded our own became moribund as a result of war or internal struggle. He states, for example that the civilization of the Tigris and Euphrates Valleys, where 40,000,000 people once lived in prosperity in an area that now meagerly sustains less than 5,000,000, declined primarily because of moral deterioration that made the population easy prey for aggressive nomadic invaders. He postulated the slaughter of 30,000,000 people.

Although it is probable that the decline of any great civilization results from more than one cause, it seems that destruction by the Mongols of the canals and headgates of the irrigation systems may have been a more potent factor in this decline than the historic slaughter. Still more fundamental factors may have been the waterlogging of the land and accumulation of salt in the soil that rendered it infertile even before the invasion.

The Tigris and Euphrates Rivers have always carried great quantities of sediment. There is ample evidence that the delta there has been built out at least 200 miles within historic times and that the rivers have changed their courses frequently.

Thus it is likely that at the time of the invasion the rivers were even then aggrading their courses and that the river level may have been higher than the surrounding land, making the water table high and drainage difficult. Under such conditions an accumulation of salt in the soil is almost certain. In the remnants of abandoned irrigation works throughout the valley lands of Iraq, and between Bagdad and ancient Ninevah, are many great canal ruins, but there are no drainage canals. It is not surprising then that the soils are so impregnated now with salts that in places they are white as snow.

In Egypt another civilization was founded on the annual flooding of the Nile lowlands, which provided fertile silt to enrich the soil and water to satisfy an arid land. In contrast to Iraq, the soil layer of the Nile Valley is underlain by coarse gravel that provides good subdrainage in the middle Nile; but in the lower Nile, where the land is low-lying, drainage is a big problem.

Furthermore, though the Nile water is otherwise of excellent quality, it is alkaline and tends to

develop black alkali in poorly drained soils, which renders them impervious and unproductive.

In Asia the "Cradle of Chinese Civilization" was the Wei River Basin, where, according to history, the first canal for irrigation was begun in 246 B.C. under China's first emperor.

According to evidence uncovered by archaeologists, the Wei project was remade in whole or in part 11 times in the last 20 centuries as a consequence of sedimentation by silt-laden waters in the irrigated area and of lowering of the river bed by entrenchment at the canal intake. The mouth of one ancient canal is at least 50 feet above the present river level. Silt problems are still present.

In our own Southwest the Pueblo and Gila Basin (or Pima) cultures were founded on agriculture and developed in areas where irrigation was possible to supplement scant rainfall.

The Pueblo culture arose in the plateau region of Arizona, Colorado, New Mexico, and Utah. It reached its peak about 1100–1300 A.D. At this time communities and villages were suddenly abandoned intact, apparently in an orderly fashion, never to be reoccupied.

A plausible explanation for the decline of the Pima culture seems to be that through excessive use of flood waters on their fields the water table gradually rose until the croplands were both waterlogged and salty—as happened in the early history of the Salt River Valley Irrigation Project. Unfortunately, the Pimas were unable to lower the water table and so had to abandon their salted lands. Thus for several centuries the American Southwest was a barren waste. The white men lowered the water table and restored these lands to fertility by water pumped from wells.

Among the hydrologic factors affecting the earth's water supply, rain and snow are the most important. However, only a small part of such precipitation becomes available for man's use. Some is evaporated directly. Some enters the ground and is used by plants and thus returns directly to the atmosphere. But some manages to pass through the root zone of plants and trees and eventually reaches the water table. Thence it moves through the rocks and later contributes to the flow of streams, sustaining their dry-weather discharge. When the rate of precipitation exceeds the ability of the soil to absorb such moisture, some of it will run off over the land surface and contribute directly to stream flow.

In general, steep slopes and impervious rocks favor very rapid runoff, but even in mountainous country a very considerable quantity of water from rain and snow sinks into the ground and is

slowly paid out in the form of springs and seeps that maintain stream flow during drought.

Low slopes, on the other hand, generally favor infiltration into the soil. If such areas are highly pervious there may be no surface runoff, as in the sand-hill area of western Nebraska. There the moisture sinks into a sandy soil and part of it eventually emerges as springs at the heads of the perennial streams rising south and east of the sand hills.

But where the soil and underlying geologic formations are impervious, very little soaks in. Thus rapid runoff, floods, and excessive erosion occur, as in the Badlands of western South Dakota.

Chemically, water begins to deteriorate as soon as it reaches the earth. It quickly dissolves some of the soluble constituents of the rocks and soils with which it comes in contact—especially in areas where carbonates, sulfates, chlorides, and other soluble minerals abound—but it picks up almost no salt in areas of granite and similar rocks.

As streams move seaward, there is a gradual concentration of minerals due to evaporation and transpiration (by plants) until in some instances, as in the lower reaches of the Pecos and Gila Rivers and the Rio Grande below El Paso, the water is no longer fit for either irrigation or industrial use.

As rain water sinks into a dry soil, it first satisfies soil-moisture deficiency by surrounding the grains with a thin film of water held in place by molecular force. Any excess over the amount required to satisfy soil-moisture deficiency may then percolate downward to the water table.

As most formations discharge water nearly continuously, a rise in the table actually reflects the excess of recharge over discharge.

Thus, far, the ground-water investigations of the Geological Survey are concerned primarily with finding and measuring the nation's ground-water resources.

Most of the studies have had to do with the availability of pure, usable water supplies, but a few dealt with drainage, flood control, construction of waterways and dams, mine drainage, and other problems to which the principles of ground-water geology apply.

U. S. Geological Survey Water-Supply Paper 992 lists about 1,800 papers and reports describing ground-water investigations made by survey specialists in cooperation with states and municipalities through 1945. While this might give the impression that much of the ground-water work has been finished, nothing could be farther from the truth. It can scarcely be called a beginning, for less than 5 per cent of the country has been covered by thorough scientific investigations.

Blood Will Tell

Condensed from Hoard's Dairyman

L. C. Ferguson

BLOOD will tell—what it will tell depends upon our ability to read its story. Scientists have deveoped methods in recent years by which many mysteries can be unravelled and many practical problems may be solved.

For ages it has been observed that "like begets like" and early in the history of cattle breeding is was observed that such characters as color, conformation, and presence of horns were passed from parents to offspring in a regular manner. However, it was not until experimental genetics, the science concerned with heredity, was developed that a reasonable explanation was forthcoming.

About the turn of the century when the foundations for genetics were being laid, it was discovered that the blood serum of some persons contained a substance called antibody which would destroy the red blood cells of other persons. After examining the blood of many people it was found that all human beings can be divided into four distinct "blood groups", depending on the presence or absence of the antibodies in their blood serum.

In early days many serious reactions followed blood transfusions due to the incompatibility, or differences in the blood groups, of the donor and the person being transfused. Soon the typing of blood became a common practice in hospitals and since then there has been little danger of transfusion accidents due to differences in the bloods.

Many scientists became interested in the blood groups of man and it soon became apparent from the early studies that these substances in the blood were inherited, being passed from parents to children in much the same manner as are eye color, color blindness, and hemophilia. These studies in man were soon extended to animals.

In 1910 a group of English scientists reported the presence of substances in the blood of cattle which they proposed were different in each individual animal. In 1937 research was started at the University of Wisconsin with the hope of extending our knowledge on the substances in the blood of cattle. It was hoped that we might be able to apply the findings to some of the practical problems in dairy cattle breeding. It was rea-

Reprinted by permission from Hoard's Dairyman,
Fort Atkinson, Wisconsin, March 10, 1950

soned that the blood of cattle would contain certain substances and if it were possible to correlate the presence of these with level of milk production, or some other important characteristic, then typing of the blood would serve as an important aid in the selection and breeding of dairy cattle.

The methods used in a study of the blood are similar to those applied to the work on disease. The blood tests for brucellosis or pullorum disease are good examples. When a foreign substance, such as the bacteria which cause brucellosis, enters the animal body a defense is set in motion. In several days there appear in the blood of that animal antibodies which will react specifically with the bacteria and destroy it. The antibodies produce this effect in the animal's body. It follows, too, that we may draw some blood from the animal and in the laboratory demonstrate a reaction between the blood serum and the foreign material (bacteria) responsible for the response in the animal. In the diagnosis of brucellosis this laboratory test is called an aggultination test. In this case, if the blood serum comes from an animal which has been affected with the disease, the antibodies will be presented and when mixed with the causative bacteria, Brucella abortus, clumping or destruction of the bacteria results.

In much the same way, if we inject the blood cells of one cow into a second cow the injected cells act as a foreign material, just as the Brucella organisms in the above example, and the second cow responds by forming antibodies for the foreign cells. It is possible to select very closely related cattle in which case the blood cells would not act as foreign material and no antibodies would be formed. In research work, however, the experimental cows were selected so that individual differences were expected. In this way antibodies would be formed by the cow being injected.

In order that the reader may follow our explanation of the blood groups of cattle and their applications it may be well to define some of the terms which will be used. Antigen is a term applied to any substance which when introduced into an animal stimulates the formation of antibodies. Therefore, Brucella abortus is an antigen and so are the substances in the blood cells of cattle. The antibodies are found in the serum of an animal as a result of a stimulation by a specific antigen. The reaction of a particular antigen with its antibody is highly specific, whether it occurs in the animal body or in the test tube in the laboratory. This antigen-antibody reaction may be likened to a lock and its key—the lock reacting only when the correct key is used. Thus the antigen reacts with its specific

antibody but not with antibodies produced against some unrelated antigen.

Another term which we will be using is gene. The gene is the unit of heredity, that small chemical entity which is present in the germ cell which controls the development of a particular character in the offspring. The following statement of the sequence of events should clarify the terms being used. A gene controls the development of an antigen in the red blood cell in the calf and that animal possesses that particular antigen. When the blood cells of this calf are injected into a cow that does not possess that particular antigen, then the antigen acts as a foreign material and stimulates the production of antibodies in the serum of the cow. The serum of this cow may be collected and in the laboratory a specific antigen-antibody reaction may be demonstrated with the blood cells of all cattle which possess the particular inherited antigen but not those lacking the antigen.

Based upon these fundamental procedures many experimental cattle have been immunized with the blood of other cattle. Following three to five weekly injections of blood there ordinarily will be developed antibodies for the antigens which are possessed by the donor but are lacking in the blood of the cow being injected. In the first such serum studied, antibodies were found to react with the blood cells of certain cattle but not with the cells of others. The antigen in the cells responsible for this reaction was named A. In the subsequent studies the antigens were named as recognized, B, C, and so on through the alphabet.

Up to the present more than forty different antigens have been recognized. The serum in which the antibody for antigen A was found has been produced in quantity and preserved in a freezer. It is referred to as "A reagent" and with it the blood cells from any cow may be readily tested in the laboratory and if the cells contain antigen A they are specifically destroyed. In the same manner serological reagents for all the forty antigens have been preserved and by testing the blood cells of an animal with each of these reagents in turn one can determine the blood type of the animal.

As these characters were being identified it was observed that the calves tended to have the antigens which were found in the blood of their parents. This led to a study of the inheritance of the antigens in a number of calves whose sire and dam were definitely known. The inheritance of each of the known antigens was studied separately but the results were quite similar in each case so that we will discuss only one of them, antigen A, to illustrate the results obtained. The matings were divided

into three groups: (1) those in which both sire and dam possessed antigen A, (2) those in which only one parent had the antigen, and (3) those in which neither sire nor dam possessed antigen A. The following table contains the results obtained in the study of antigen A:

Type of mating	No. of matings	Number of Calves	
		Antigen present	Antigen absent
A & A	217	217	23
A & —	119	76	51
— & —	39	0	41

A careful examination of these figures suggests that antigen A is inherited in a very simple manner. The other antigens have been studied in this same manner and in each case the type of inheritance appears identical although the actual figures do vary as would be expected.

With this experimental evidence available there is no question but that the antigens in the red blood cells of cattle are inherited in a regular manner. Attempts are now being made to associate certain of the antigens with physical characteristics. Studies which have been made on the occurrence of the antigens in the various breeds of cattle definitely show that there are differences between breeds. These differences are not a one hundred per cent presence or absence but there are differences in the frequency of a particular antigen. For example, antigen "I" is found in about 50 per cent of the Guernsey cattle tested while in the Holstein cattle only about 5 per cent possess antigen "I."

In a recent study of a herd of Ayrshire cattle one family, all cows by the same sire, were rather uniform in type and also in a desirable level of milk production. The blood type of all these animals was similar. In contrast a family of another sire was more variable in type and production and their blood types were definitely quite different from the first family of cows. This preliminary observation and other comparable experiments will eventually lead to the use of the antigens of the blood as an adjunct to selection and breeding in dairy cattle. The original hypothesis made early in the work, that certain cellular antigens might be associated or correlated with the level of milk production, has not been proven but the preliminary observations certainly make us optimistic that such a relationship will be found in future studies.

In addition to the proposed use of the cellular antigens in studies in dairy cattle selection and breeding, the methods are now being applied as an aid in identifying cattle. In the discussion on the inheritance of the antigens it was noted that a calf possesses the particular antigen only if one or both parents have the character. Be-

cause of this type of inheritance it is possible to use the cellular antigens in determining parentage by exclusion. This can best be explained by a few examples drawn from actual cases of questionable parentage. The following table illustrates a case in which a calf was born following the use of artificial insemination in which the semen from two bulls was used:

Animals tested	Antigens contained in blood
Bull No. 1	A B C E W H′
Bull No. 2	A B C E O W Z H′
Dam	A J W Z H′
Calf	A B O W Z H′

Comparison of the antigens in the blood of the calf and the dam reveals that the calf has antigens B and O which are not found in the blood of the dam. These antigens must, then, have come from the sire. Bull No. 1 has antigen B but he does not have antigen O, and therefore he can be excluded as the sire of the calf. Bull No. 2 possess both antigens B and O and so no exclusion is possible. Since, in this case, there were just the two possibilities, the exclusion of Bull No. 1 and the inability to exclude Bull No. 2 would obviously allow the conclusion that Bull No. 2 actually sired the calf. It should be noted that a definite statement in such cases is possible only in excluding an animal as a possible parent.

The widespread use of artificial insemination in cattle during recent years has greatly increased the possibility of confused identity as illustrated in the above case. Although the technicians handling the semen may use every precaution, there exist opportunities of mixing the samples from the time of collection to the insemination of the cattle. In addition, there are those instances in which a bull on the farm may breed a cow after she has been inseminated artificially, and there would be no way of determining the true sire other than by the blood test.

A definite answer depends on exclusion and exclusion is only possible when the blood of all the animals has been tested. There are occasionally cases of questionable parentage which can not be answered by this method. As an example the following case is presented in which a cow was bred to two bulls and the sire of the resulting calf was not known.

The calf in this case possesses only antigens which are present in the blood of the dam. Because of this distribution of the antigens it is impossible to exclude either one of the bulls and an answer in such a case just cannot be given. Fortunately, this type of distribution of the antigens is not frequent and with the increasing number of antigens which have been identified the chances become less that an exclusion cannot be made.

By applying special methods in the laboratory it is now possible

to conclude rather definitely whether a particular set of twins are actually identical; that is, whether they both arose from a single fertilized egg. This determination can be made even though there may have been fusion of fetal circulation during early development.

Arising from these studies was the observation of the Wisconsin workers that by similar methods of blood testing it is possible to determine whether a heifer born twin to a bull (a freemartin) is sterile.

Thus, the blood of the twins, both heifer and bull, may be tested anytime after birth and identical blood types suggest that the heifer is a freemartin and will be sterile. A dissimilarity in blood types, as is expected in normal twins arising from two separate fertilized eggs, indicates that the heifer will be normal in her reproduction organs. These tests are now being carried out at the Ohio State University with the hope of learning more about the incidence of this abnormality in twins.

There is a practical note in this question to the dairy farmer. Even though it has been estimated that 90% of heifers born twin to a bull are sterile, still the average herd owner will gamble on that ten per cent. The feeding and care of a heifer for two years only to learn that he "lost the bet" is far from profitable. With the blood typing completed at an early age the sterile heifer may be sold for veal to make room for a profitable animal.

Just over two years ago the Ohio State University development fund assisted in organizing a research project on the blood of cattle. Now the Ohio State University in cooperation with the Ohio Agricultural Experiment Station, and the Bureau of Dairy Industry has opened a laboratory which will be carrying on research in the applications of these methods in dairy cattle breeding. Also this laboratory is equipped to type the blood of cattle as an aid in maintaining their identity. This testing is being arranged through the different dairy cattle breed associations.

In addition to this work in the Ohio laboratory, studies on the cellular antigens have been continued at the University of Wisconsin. Furthermore, a laboratory at the Ontario Veterinary College at Guelph has taken up this work. Other institutions have become considerably interested and there is hope of great expansion of the research in this field in the future. With the studies continuing in these various laboratories progress will certainly be made which will be applicable to advancement in dairy cattle breeding.

Gas Beyond The City Main

Condensed from Agricultural Situation

Albert P. Brodell
Bureau of Agricultural Economics, U.S.D.A.

BEYOND the limits of cities and towns, it is a rare home that gets gas from a pipe line. Nevertheless, hundreds of thousands of United States farmers are using gas for cooking, heating, refrigeration and other purposes. These appliances are being fueled with liquefied petroleum gases that are delivered to farms in steel cylinders or in tank trucks.

Surveys made in 1946 showed LP-gas was being used in about 3½ million homes throughout the nation. Thirty-six to 42 percent of the users, according to reports, were farmers. This year a field survey by BAE in which dealers and distributors were contacted in most States in the eastern half of the country indicated the number of farm users has increased appreciably since 1946. Today, it is likely that around a fourth of our farmers are using liquefied petroleum gases in one or more ways.

Liquefied petroleum gases, are largely butane, propane or a mixture of the two. They are derived from either natural gas or oil refinery gases. Farmers who obtain these gases from tank trucks have storage tanks usually ranging from 100 to 1,000 gallons in size. Those who buy it in cylinders generally have two cylinders connected in such a way that when one becomes empty the other supplies gas. The empty cylinder is replaced by the local dealer who usually takes it to a central plant for refilling. Most cylinders hold about 23½ gallons or 100 pounds.

LP-gas is under pressure while in storage tanks or cylinders which keeps it in liquid form. When the valve to the stove or other appliance is opened, pressure is lowered and the liquid immediately gasifies.

LP-gas also turns to liquid when the temperature falls below its "boiling point." The boiling point for butane is 33° above zero Fahrenheit. For this reason, on most farms where butane is used the tanks in which it is stored are placed underground where the temperature remains above 33° throughout the year. As a liquid, of course, it cannot be used as fuel for gas appliances. The boiling point for propane, on the other hand, is 44° below zero. It can be stored either above or below ground in most areas of the coun-

Reprinted by permission from Agricultural Situation
Washington, D. C., August 1949

try. Consequently, it is more widely used in northern areas.

The amount of LP-gas used per farm per year varies widely in different areas of the country. In the northern areas, where most of the gas is bought in cylinders and is mainly used for cooking, reports from dealers and distributors show an average of 90 to 125 gallons per farm user. In the Central and Southern Great Plains and in the Southwest where LP-gas is extensively used for heating homes, average consumption per farm user in some areas ranges from 500 to 1,000 gallons.

In the Southwest, some bulk users are now paying less than 10 cents per gallon for LP-gas. In more northern areas where farmers buy in replaceable cylinders prices usually range from 30 to 50 cents per gallon.

In the areas where LP-gas is sold in bulk at relatively low prices, use of these gases for heating farm homes is increasing rapidly. In many areas of the Central Plains, and in the Southern areas from the Mississippi Delta to the West coast, dealers and distributors report that many farm homes are now heated with LP-gas.

Most of the farm consumers in all parts of the country use it for cooking. In many States, reports indicate that it is more extensively used for this purpose than is electricity. In most northern areas, a combination stove is often sold which uses wood or coal in addition to gas or electricity. LP-gas is also used in the farm home to heat water and to operate gas refrigerators.

In farm homes, where LP-gas is used for cooking only, around 90 gallons will be consumed in a year. Cooking, heating water, and operating a gas refrigerator in an average farm home will require around 300 gallons a year.

LP-gas also is used for heating water on dairy farms, for gas brooders, for .flame weeders, for dehydrating purposes and, to some extent, for curing tobacco in the Southeast. It is also used as a fuel for internal combustion engines, particularly stationary engines for which it is at least as satisfactory and often cheaper than other petroleum fuels. This seems to be fairly important in the irrigation areas which depend on deep wells for water. Some farm tractors now use LP-gas and tractors built especially for this fuel are now being produced.

Taking all uses into consideration farmers probably will use more than 600 million gallons of LP-gas in 1950. Total farm consumption of all liquid petroleum fuels in 1949 will likely approximate 8 billion gallons. Most of it will be used for tractors, farm automobiles, and farm motortrucks.

Lebanese Farmers Adopt New Practices

Condensed from Foreign Agriculture

Marie Puhr
Information Specialist, Farm Credit Administration

PUTTING the results of research into practical use on the farm is not always easy even in the United States with its highly efficient extension service. In countries like Lebanon that have no such organization, getting this information to farmers is more difficult. But when I was in Lebanon last summer, I found that new methods are reaching its farmers —through students who have studied at home and abroad and through such organizations as the Near East Foundation and the American University of Beirut. Lebanese farmers are eager to learn and are rapidly adopting up-to-date agricultural methods.

Lebanon is a country of contrasts, with deep valleys and high mountains that border the sea. In agricultural practices there are also contrasts—the old intermingles with the new. Tractors are in operation in some fields. Nearby, farmers use tools that have come down from Biblical times. Modern trucks speed along the highways past donkeys and camel caravans.

About three-forths of the country's 1.5 million people are engaged in agriculture. The 1,000 square miles of cultivated land in this small country, which skirts the eastern shore of the Mediterranean, present a diversified agriculture.

Along the coast there are banana, olive, and citrus groves and vegetables. On the neatly terraced mountainsides, fruits are grown. Crossing over the Lebanon Mountains into the Bekaa Valley, one finds grain, mostly wheat and barley. Other crops are dye legumes, such as beans, lentils, chickpeas, and vetches. Sesame is grown and is a source of vegetable oil, supplementing olive oil, which is commonly used in cooking. Grapes are found in most parts of the country as well as figs. Apple and pear orchards are on the higher mountain slopes. On the sandy soil, delicious melons are grown. The livestock seems to be mostly cattle, fat-tailed sheep, and goats.

Tobacco, of the Turkish variety, is an important crop in some areas. I saw it being dried out of doors stretched over wires or cord. This is possible because of the absence of rain during the summer.

The silk industry, once im-

Reprinted by permission from Foreign Agriculture,
Washington, D. C., February 1950

portant, has declined with competition from Japan and the coming of rayon and nylon. In many places, banana groves have replaced mulberry trees.

Land in Lebanon has been cultivated for thousands of years. The cultivation has been mostly with hand implements, and it is usual to see an entire family working together especially at harvesttime. The hand sickle, the threshing sled, the nail plow, the pickax, and other similar hand tools are used. While combines and tractors operate in a few areas, most of the threshing I saw involved pulling a sled either by oxen or horses over the grain and then tossing it into the air with a winnowing fork and letting the wind separate the chaff from the grain. In the Bekaa Valley, however, I saw hand fanning machines used for this purpose.

Farmers live in villages and carry on many of their activities in rather close cooperation with their neighbors. Their farming practices have come to them through a rich heritage of the past and are closely intermingled with their religion. The people are intelligent and forthright, and it has been shown that when they learn about better practices they are likely to adopt them.

Farms are small. On the average, a farmer in the mountain area owns no more than 3 to 5 acres, which are intensively cultivated. These mountain farmers maintain a relatively high standard of living from the produce of their few acres often supplemented by remittances from emigrants abroad. Yet many farmers have found that they can improve their yields by using up-to-date practices, such as fertilizers, insect controls, and better seeds.

I visited several villages where new farming methods have been adopted. An outstanding example is the village of Abadiyeh. Here, one of the farmers had studied in France and learned many modern agricultural practices. His uncle had studied agriculture in the United States. One of the things that they learned about and transplanted to their own land was cooperation in marketing farm products and purchasing farm supplies.

The Abadiyeh cooperative is bringing to its 185 members and the other people of the village many new and better farm practices—the use of insecticides and commercial fertilizer, for example. When the cooperative introduced insecticides, many farmers had never used them, but they were eager to learn. And soon pests were being controlled on all farms by up-to-date methods. Commercial fertilizer, too, is now in general use in the village farming area.

The cooperative's principal activity is marketing fruits and vegetables for its members. Previously

a farmer had to take his produce to Beirut, some 10 miles away, by donkeyback or pay a high price to have a truck stop to pick it up. Often perishable products spoiled before they could be sent to market or during the haul on donkeyback. Now farmers deliver fruits and vegetables to the cooperative when they return to the village from their fields in the evening. The next morning the cooperative's truck carries the load to the Beirut wholesale market where it is sold. The members are paid four times a month.

The fruits and vegetables are graded and packed in the field in a special crate, developed by the cooperative, that has a cover that slips firmly into place without nailing. This makes packing easy. It also facilitates grade inspection at the cooperative. The grading by the members of the cooperative is so highly regarded at the Beirut market that no regrading is done.

A big part of the cooperative's business consists of buying for its members supplies, such as insecticides and fertilizer, and tools needed in cultivating the land. Another important job is supplying credit to members. In contrast to the 15-percent to 25-percent interest charged for loans in the village the cooperative's rate is 5 percent for production purposes.

The cooperative sponsors an agricultural fair. Last year the Minister of Agriculture for Lebanon was the principal speaker. Prizes were awarded for the best fruits and vegetables that the farmers displayed.

Another place where I saw a project of great value to farmers was in the Bekaa Valley. This valley, once one of the granaries of the Roman Empire, was cut off from much of the country for centuries because of the mountains on both sides. Now there are modern roads over the mountains to Beirut and Damascus.

In the village of Marj, a new "know how" has been brought to the people by the Near East Foundation. Here, I visited the headquarters building of the Foundation, which houses a clinic. The strides taken in a few years' time have made the village a healthier, happier, and more sanitary place to live. The people are better fed because they are producing more food.

An agricultural agent lives in the village and farms with the people. In this way, he is able to bring to them better practices. His farm is really a demonstration area for, as he says, "seeing is believing." For example, he used fertilizer on his grain land. When farmers with adjoining acres saw the grain develop into a better crop with larger yields, they asked about it and were told about the magic of plant food. The next year, 75 percent of them used fertilizer.

In the Bekaa Valley, new power

pumps are facilitating irrigation that has been carried on for centuries. Hundreds of acres of tomatoes, potatoes, onions, and other crops are flourishing here. The villagers at first were skeptical about getting underground water. After they saw a few pumps operating, however, it was not long before 20 companies were formed and 300 power pumps were in use.

A health program has reduced the malaria rate from 95 percent to less than 5 percent. This was accomplished simply by spraying ditches and homes with DDT and using certain other sanitation methods.

A group health program has also been developed. The people of the village now have the services of a doctor at reasonable cost. On certain days he comes to the clinic where members get free service. For calls to the home, however, there is a small charge. A new program, that of teaching midwives better practices, has resulted in a lower infant-mortality rate, and children in the village are healthier too.

In other ways also the village has advanced. To train leaders to carry on a program among their own people, a boys' club was formed. It now has a club room and a library of agricultural books. This club sponsors such activities as plays and movies, which have become an important part of the villagers' lives.

Since Lebanon has such a diversified agriculture and is such a small country, it is extremely difficult to carry on all the research necessary to meet its varied needs. Lebanese are aware of the sources of information on methods and practices already developed in other countries and are adapting them to conditions in their own country.

Highbush Blueberries

Condensed from Farm Research

John C. Cain

New York Agricultural Experiment Station

THE highbush blueberry has been cultivated by man a relatively short time—about 30 years, although its wild ancestors were prized by the Indians prior to the arrival of white settlers.

The necessity and economy of more efficient land usage, concurrent with modern agricultural development, has recently brought this highly prized fruit out of its native habitat into the ranks of other standard cultivated fruits. By selection of desirable wild plants and by breeding and propagation, standard varieties are now in production that far surpass

Reprinted by permission from Farm Research
Geneva, New York, April 1949

wild plants in size, flavor, and productiveness. Under favorable soil, fertilizer, and cultural practices, yields of 8,000 to 10,000 pints to the acre are not uncommon.

The natural habitat of the high-bush blueberry is usually the low-land swamp or hammock under relatively moist, acid (pH 4.0 to 5.0) soil conditions, with a shallow, year-round water table. The shrub has a shallow, fibrous root system that grows largely in the leaf mold and humus layer above the water table in its natural habitat, thus acquiring a maximum of both oxygen and water.

Thus far, most successful commercial plantings have been made on the acid cranberry bog peat and sand flatlands of New Jersey and sand or peat flatlands elsewhere. However, in general, any soil that is porous enough for the free movement of air and water and has an adequate year-round supply of water can be made to produce satisfactory blueberries with proper fertilization.

Recent experimental blueberry plantings at Geneva have made vigorous growth on wet, poorly drained soil when planted on mounds, and with sawdust incorporated with the soil and used as a mulch. Other plants are doing well on a high, well-drained—normally dry—knoll by using heavy sawdust mulch to conserve water. Both of these soils are above pH 6.0.

Sand culture experiments at Geneva have shown that blueberries will grow very vigorously even at pH 6.5 if the necessary nutrients are maintained in available form or fail to grow at pH 4.5 with inadequate nutrients. Blueberry plants seem to have a relatively low requirement for potassium, calcium, and phosphorus, and a high requirement for iron, manganese, and possibly magnesium, compared to fruit trees. They respond vigorously to nitrogen, apparently absorbing the ammonium ion more readily than the nitrate ion.

Most soils with a pH value above 5.5 to 6.0 are fairly well supplied with calcium, but are low in available iron and manganese, and the nitrogen is likely to be largely in the nitrate form. In addition, many of these soils have a clay texture, are somewhat poorly aerated, and may be subject to drying at the surface in summer. These may be some of the reasons why blueberries usually fail on soils of this type.

Experimental blueberry plants potted in Dunkirk silty clay loam, pH 6.5, mixed with sawdust or vermiculite to improve drainage and aeration, have grown well when irrigated with a suitable nutrient solution. Other plants potted in the straight clay soil acidified to pH 4.5 failed completely even though irrigated with the same nutrient solution. This indicates that aeration is an important point.

INDEX

BEEF CATTLE

Preventable Waste ..... Jan., 1950
Corncobs Make Good Beef ..... Jan., 1950
Do Steers Need Room ..... Jan., 1950
Brahmans Tackle the Midwest ..... Feb., 1950
Making Money on Beef ..... Feb., 1950
Purebred Livestock Production ..... Feb., 1950
Are Crossbred Cattle Better? ..... Mar., 1950
Breeding Range Heifers ..... Apr., 1950
Cattle Production in Cuba ..... Apr. 1950
Prove Bull's Value as a Calf ..... May, 1950
Causes of Multiple Births in Cattle ..... May, 1950
Use of Roughage for Steers ..... May, 1950
Fat Steers from Pasturage ..... May, 1950

CONSERVATION

Protect the Birds ..... June, 1949
Farm Game Program in Maryland ..... June, 1949
Who Cares about Tomorrow? ..... June, 1949
Fires Die Down ..... A-S 1949
Don't Waste Your Best Land ..... A-S 1949
Italy's Major Land Problem ..... Oct., 1949
Coal Today, Crops Tomorrow ..... Feb., 1950
The Grass That Nobody Wanted ..... Mar., 1950
Land Capability ..... May, 1950

CROPS

Doing the "impossible" with Corn ..... Nov., 1949
Grass Farming in Britain ..... Nov., 1949
Red Clover—Alfalfa Seed Production ..... Dec., 1949
Know How to Buy Seed Corn ..... Dec., 1949
Meadows indicate Soil Productivity ..... Dec., 1949
What Makes Big Yields? ..... Jan., 1950
Drainage Tripled Grain Yields ..... Jan., 1950
A Promising Forage Crop ..... Feb., 1950
Food Revolution? ..... Feb., 1950
Legumes Need Nitrogen ..... Feb., 1950
How Much Is Too Much Fertility ..... Feb., 1950
In the Land of the Corn God ..... Feb., 1950
Safflower—Newest Old Crop ..... Mar., 1950
Mathematics of Growing Corn ..... Mar., 1950
*Disease-Free Corn ..... Mar., 1950
*Hybrid Corn Goes to Italy ..... Mar., 1950
Good Legume Stands ..... Apr., 1950
Blueprint for Hungry Nations ..... Apr., 1950
Lespedeza Serecia for Paper ..... Apr., 1950
Sweet Clover ..... May, 1950
The World is Our Nursery ..... May, 1950

DAIRY CATTLE

*Protect Silage from Freezing ..... Jan., 1950
10 Calves a Year ..... Jan., 1950
Young Cows Need Extra Feed ..... Feb., 1950
Fat in Cow Feed ..... Feb., 1950
A Good Breeding Record ..... Feb., 1950
Steps in Dairy Herd Improvement ..... Mar., 1950
"Canned" Milk ..... Mar., 1950
New Drug for Mastitis Control ..... Mar., 1950
Nature's Quirks in the Dairy Herd ..... Mar., 1950
*Old Cows Resist Mastitis ..... Mar., 1950
*Cows Gain on Early Hay ..... Mar., 1950
All the Milk She Can Give ..... Apr., 1950
Dairy Cattle Feeding ..... Apr., 1950
Fire Efficiency ..... May, 1950
Aureomycin for Mastitis ..... May, 1950
Practical Milking Problems ..... May, 1950
Paper Towels for Cows' Udders ..... May, 1950

FARM BUILDINGS

Try Pen Stabling ..... A-S 1949
Does It "Rain" in Your Barn? ..... Feb., 1950
Vermiculite Concrete ..... Apr., 1950
Building Boards and Sheets ..... Apr., 1950
New Idea in Bull Housing ..... Apr., 1950
Aluminum in Farm Buildings ..... May, 1950

FARM ECONOMICS

Marketing—The No. 1 Project ..... July, 1949
How Much Livestock? ..... July, 1949
Prices and Profits ..... A-S 1949
Polish Village Rebuilding ..... A-S 1949
Test Your Farm Business ..... Oct., 1949
How Sure is Your Fire Insurance? ..... Oct., 1949
Meat Animals in National Economy ..... Oct., 1949
Good Farm Practices ..... Nov., 1949
Foreign Trade—Two Way Street ..... Nov., 1949
Flexible Farming is Best ..... Nov., 1949
Lower Income or More Efficiency? ..... Nov., 1949
U.S. Scouts World's Markets ..... Dec., 1949
Farm Accident Toll ..... Dec., 1949
Ranching and Good Farming ..... May, 1950

FARM EQUIPMENT AND MACHINERY

Forage Harvester on Small Farm ..... Oct., 1949
Weed Control Equipment ..... Oct., 1949
Revolutionary Milk Cooler ..... Nov., 1949
*Seal Your Crops in Cans ..... Nov., 1949
Frostguard—New Invention ..... Nov., 1949
Why Let Machines Rust Away ..... Dec., 1949
Fence In Your Farm Profits ..... Dec., 1949
Portable Elevators Save Labor ..... Dec., 1949
*Unload Feed by Suction ..... Jan., 1950
New Type Silo ..... Feb., 1950
Don't Fool with Electricity ..... Mar., 1950
Farm Machinery in the Fifties ..... Apr., 1950
Next Summer's Rain ..... Apr., 1950
How to Repair Concrete ..... Apr., 1950
Farm Crop Driers ..... May, 1950
New Chemical Speeds Cleaning ..... May, 1950

FEEDS

"Hidden Starvation" in Livestock ..... May, 1949
Making Grass Silage ..... June, 1949
If You Haven't Enough Hay! ..... Dec., 1949
Fat in Cow Feed ..... Feb., 1950
Insulated "A" in Mixed Feeds ..... Mar., 1950
Meadow Crop Silage ..... May, 1950

FERTILIZERS & COMPOSTS

Methods of Applying Fertilizers ..... May, 1949
What Yields do You Want? ..... July, 1949
The Cost of Not Using Lime ..... July, 1949
Manufactured Compost ..... A-S 1949
What Fertilizers Can Do For You ..... Oct., 1949
Magnesium in Plant Growth ..... Oct., 1949
Fertilizers Improve Alfalfa ..... Dec., 1949
Radioactive Fertilizers ..... Jan., 1950
Use of Lime ..... Jan., 1950
The Phosphate Story ..... Mar., 1950
Too Much Nitrogen? ..... Mar., 1950
Nitrate by Air ..... Mar., 1950
Increasing Production ..... Apr., 1950

FORESTRY

A Right Time to Harvest Trees ..... Dec., 1949
*Liquid Nitrogen ..... Dec., 1949

INDEX

The Rebirth of Israel ..... Feb., 1950
Forests Get Out of the Woods ..... Mar., 1950
*Home Grown Fence Posts ..... Mar., 1950
*How to Measure Standing Timber ..... Mar., 1950
Partnership in the Woods ..... Apr., 1950

FRUIT

Planting New Orchards ..... Nov., 1949
Frostguard—New Invention ..... Nov., 1949
New Sprayed-on Fertilizer ..... Nov., 1949
Orchardist Sells Air and Water ..... Dec., 1949
Gold from Citrus Waste ..... Jan., 1950
Scientific Neglect ..... Jan., 1950
Cover Crop Variation ..... Feb., 1950
Chemotherapy ..... May, 1950

HAY

Hay-Driers Make Top Quality Hay ..... May, 1949
Drying Baled Hay with Heat ..... June, 1949
Curing Hay in the Stack ..... July, 1949
Crushing Hay Cuts Curing Time ..... July, 1949
*Coarse Chopping Makes Better Hay ..... Feb., 1950

HOGS

Select for Production Factors ..... Nov., 1949
Do You Cheat Your Pigs? ..... Dec., 1949
Hogs for Profit ..... Dec., 1949
Hog Growers Debate ..... Jan., 1950
How Fat Should a Hog Be? ..... Jan., 1950
Self-Feeding Brood Sows ..... Jan., 1950
How Denmark "Tailored" Its Pork ..... Feb., 1950
Proper Feeding Means More Profit ..... Feb., 1950
For a Better Pig Crop ..... Mar., 1950
Increase Your Swine Profits ..... Mar., 1950
*New Meat-Type Hog Gets Test ..... Mar., 1950
More Profit from Hogs ..... Apr., 1950
Good Pasture for Hogs ..... Apr., 1950
Soy Meal for Pigs ..... May, 1950
Profits from Raising More Pigs ..... May, 1950

HORSES

Moon Blindness Preventable ..... Nov., 1949
Periodic Opthalmia ..... Apr., 1950

INSECTS & INSECTICIDES

Pick-Pocket Pests ..... Dec., 1949
Insects Are Different ..... Jan., 1950
Lindane for Fly Control ..... Jan., 1950
*Spray Mixture for Fruits ..... Mar., 1950
Toxaphane Gets Cutworms on Corn ..... May, 1950
Spittle Bugs and BHC Spray ..... May, 1950

PASTURES

Ladino Clover makes Best Pasture ..... Nov., 1949
'Feedlot' Pastures ..... Dec., 1949
Birdsfoot Trefoil for Pastures ..... Jan., 1950
Lush Meadows on Worn Hills ..... Jan., 1950
How Pasture Winners Did It ..... Feb., 1950
Rye Pasture ..... Apr., 1950

POULTRY

Causes of Wet Litter ..... Nov., 1949
Vitamin B-12 Cuts Feed Costs ..... Dec., 1949
Almost 100% Livability ..... Dec., 1949
Barbecuing Turkey is Fun ..... Dec., 1949
If 'Colds' Are Troubling You ..... Dec., 1949
Reports on Automatic Feeding ..... Jan., 1950
*Time of Feeding and Laying ..... Feb., 1950
Confinement-Reared Pullets ..... Feb., 1950
How Good Are the Eggs You Sell? ..... Feb., 1950
*Hatchability in Dark Brown Eggs ..... Feb., 1950
Cannibals Cost Money ..... Mar., 1950
New Chicks on Old Litter ..... Mar., 1950
Balut—A Duck-Egg Delicacy ..... Mar., 1950
Pheasant Raising for Profit ..... Apr., 1950
Waste Products into Cash ..... Apr., 1950
Debeaking Day-Old Chicks ..... Apr., 1950
Pelletized Dairy Products ..... Apr., 1950
Radiant Heating ..... Apr., 1950
Prefabricated Cockerels ..... May, 1950
Where the Small Turkey Fits in ..... May, 1950
Key to Danish Egg Quality ..... May, 1950

SHEEP AND GOATS

*Feed Lambs Silage ..... Oct., 1949
A System Worth Trying ..... Nov., 1949
Testing Ewes for Lambs & Wool ..... Jan., 1950
You Can't Make Hogs of Lambs ..... Feb., 1950
Farm Flock Production Problems ..... Mar., 1950
Sheep Raising Tips ..... Apr., 1950
They're Building New Sheep ..... May, 1950
Newborn Lambs Need Vitamin C ..... May, 1950

SOILS

Our Soils and our Food ..... Apr., 1949
1 in 3,000,000! ..... June, 1949
What Yields do you want? ..... July, 1949
Cows are Capable Soil Chemists ..... July, 1949
How to Manage Orchard Soils ..... July, 1949
Soil Yields New Medicines ..... A-S 1949
Soil Will Tell Your Fortune ..... Jan., 1950
Organic Matter ..... Feb., 1950
Farmers—Winds—Soils ..... Mar., 1950
One Inch Topsoil = Bushels ..... May, 1950

VEGETABLES

Like to Weed Onions? ..... Dec., 1949
Sweet Potato Sprout Decay ..... Jan., 1950
*Winter Storing Celery ..... Feb., 1950
*Pick Good Baking Potatoes ..... Feb., 1950

WEEDS

Weed Control Equipment ..... Oct., 1949
Controlling Canada Thistle ..... Nov., 1949
New Methods of Weed Control ..... Nov., 1949
2,4-D on Bluegrass ..... Jan., 1950
Scientist—'Farmer' ..... Mar., 1950
Better Weed Killers ..... Apr., 1950

MISCELLANEOUS

Roots ..... Dec., 1949
Don't Shoot That Owl! ..... Dec., 1949
Mechanize & Revolutionize ..... Dec., 1949
'Cows' Up a Tree ..... Jan., 1950
Barberry Eradication ..... Jan., 1950
Cutting Farmers' Fire Losses ..... Jan., 1950
Alaska ..... Jan., 1950
Breed Association Directory ..... Jan., 1950
Washington—First of All a Farmer ..... Feb., 1950
Honey—Golden Wonder ..... Feb., 1950
The Scottish Farmer ..... Feb., 1950
More Plant, Less Water ..... Feb., 1950
A Fireproof Mulch ..... Feb., 1950
Chemotherapy ..... Feb., 1950
Farming on the Aran Islands ..... Mar., 1950
Chips on the Land ..... Mar., 1950
Farm Laborer to Farm Owner ..... Mar., 1950
Improve Attack on Rats ..... Mar., 1950
Does a Plant See? ..... Apr., 1950
Good Oil Pays Dividends ..... May, 1950
Sowing Seeds of Knowledge ..... May, 1950
Fur Seal Herds of Alaska ..... May, 1950

* Short Articles.

For the Farmer's Library

Hunger Signs in Crops—A symposium, edited by Gove Hamboge. Again available. Published by the American Society of Agronomy and the National Fertilizer Association. $4.50.

Forage Crops—By Gilbert H. Ahlgren, Professor of Farm Crops, Rutgers University, and Research Specialist, New Jersey Agricultural Experiment Station. McGraw-Hill Book Company. $5.00.

Principles of Field Crop Production—By John H. Martin, Senior Agronomist, Bureau of Plant Industry, U.S.D.A., and Warren H. Leonard, Professor of Agronomy, Colorado A. & M. College. The Macmillan Company. $6.00.

Humus and the Farmer—By Friend Sykes, British Farmer. Illustrated. Rodale Press. $4.50.

Feeds and Feeding—By F. B. Morrison, Prof., Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $7.00 (Revised).

Management and Feeding of Sheep—By E. T. Baker. Orange Judd Publ. Co., Inc. $3.50.

Dairy Cattle Feeding and Management—By H. O. Henderson, Prof. of Dairy Husbandry, Univ. of W. Va., Carl W. Larson and Fred S. Putney. John Wiley & Sons, Inc. $5.00.

Dairy Science—By W. E. Petersen, Asso. Prof. Dairy Husbandry, Univ. of Minn. J. B. Lippincott Co. $5.00.

Animal Sanitation and Disease Control—By R. R. Dykstra, Dean, School of Veterinary Medicine, Kansas State College. Interstate Printers & Publishers. $3.50.

Pigs: From Cave to Corn Belt—By Charles Wayland Towne, Author and Public-Relations Expert, and Edward Norris Wentworth, Director, Armour's Livestock Bureau. University of Oklahoma Press. $4.00.

Profitable Poultry Keeping—By H. Clyde Knandel, Head, Dept. Poultry Husbandry, Pa. State College. Orange Judd. Co., Inc. $3.00.

Successful Poultry Management—By Morley A. Jull, Professor and Head of Poultry Dept., Univ. of Maryland. McGraw-Hill Book Co., Inc. $3.75.

Fruit Science—By Norman F. Childers, Professor and Research Specialist in Horticulture, N. J. Agri. Exp. Station. J. B. Lippincott Co. $5.00.

Soil Conservation—By Hugh Hammond Bennett, Chief, S.C.S., U.S.D.A. McGraw-Hill Book Co., Inc. $6.50.

Farm Records and Accounts—By John Norman Efferson, Professor of Farm Management, College of Agriculture, Louisiana State University. John Wiley & Sons, Inc. $3.25.

Farm Structures—By H. J. Barre, Professor of Agricultural Engineering, and L. L. Sammet, formerly Associate Professor of Agricultural Engineering, Purdue University. John Wiley & Sons, Inc. $7.00.

The Farmer's Handbook—By John M. White, County Agent and Soil Conservation Specialist, Okla. A. & M. College. Univ. of Okla. Press. $4.95.

Perennial Harvest—By Philip Hillyer Smith. Illustrated by William Thomas Woodward. An experiment in country living. Harper & Brothers. $3.00.

For the convenience of our readers, books listed may be purchased through this Department. Address Farmers Digest, Ambler, Pa.

"Next comes the earth, the one division of the natural world on which for its merits we have bestowed the venerable title of mother. She belongs to men as the sky belongs to God. She receives us at birth, and gives us nurture after birth, and when once brought forth she upholds us always, and at the last when we have now been disinherited by the rest of nature she embraces us in her bosom and at the very time gives us maternal shelter; sanctified by no service more than that whereby she makes us also sacred, even bearing our monuments and epitaphs and prolonging our name and extending our memory against the shortness of time; whose divinity is the last which in anger we invoke to lie heavy on those who are now no more, as though we did not know that she is the only element that is never wroth with man. Water rises in mist, freezes into hail, swells in waves, falls headlong in torrents; air becomes thick with clouds and rages with storms; but earth is kind and gentle and indulgent, ever a handmaid in the service of mortals, producing under our compulsion, or lavishing of her own accord, what scents and savours, what juices, what surfaces for the touch, what colours! how honestly she repays the interest lent her! what produce she fosters for our benefit!

Pliny—*"Natural History"* 1st Century A. D.